



cirad

AGRICULTURAL RESEARCH
FOR DEVELOPMENT

HIGHLIGHTS
2016

ACTIVITIES REPORT

SPOTLIGHT

TROPICAL
SUPPLY CHAINS
AND SUSTAINABLE
DEVELOPMENT

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PRESENTATION OF CIRAD

CIRAD is the French agricultural research and international cooperation organization working for the sustainable development of tropical and Mediterranean regions

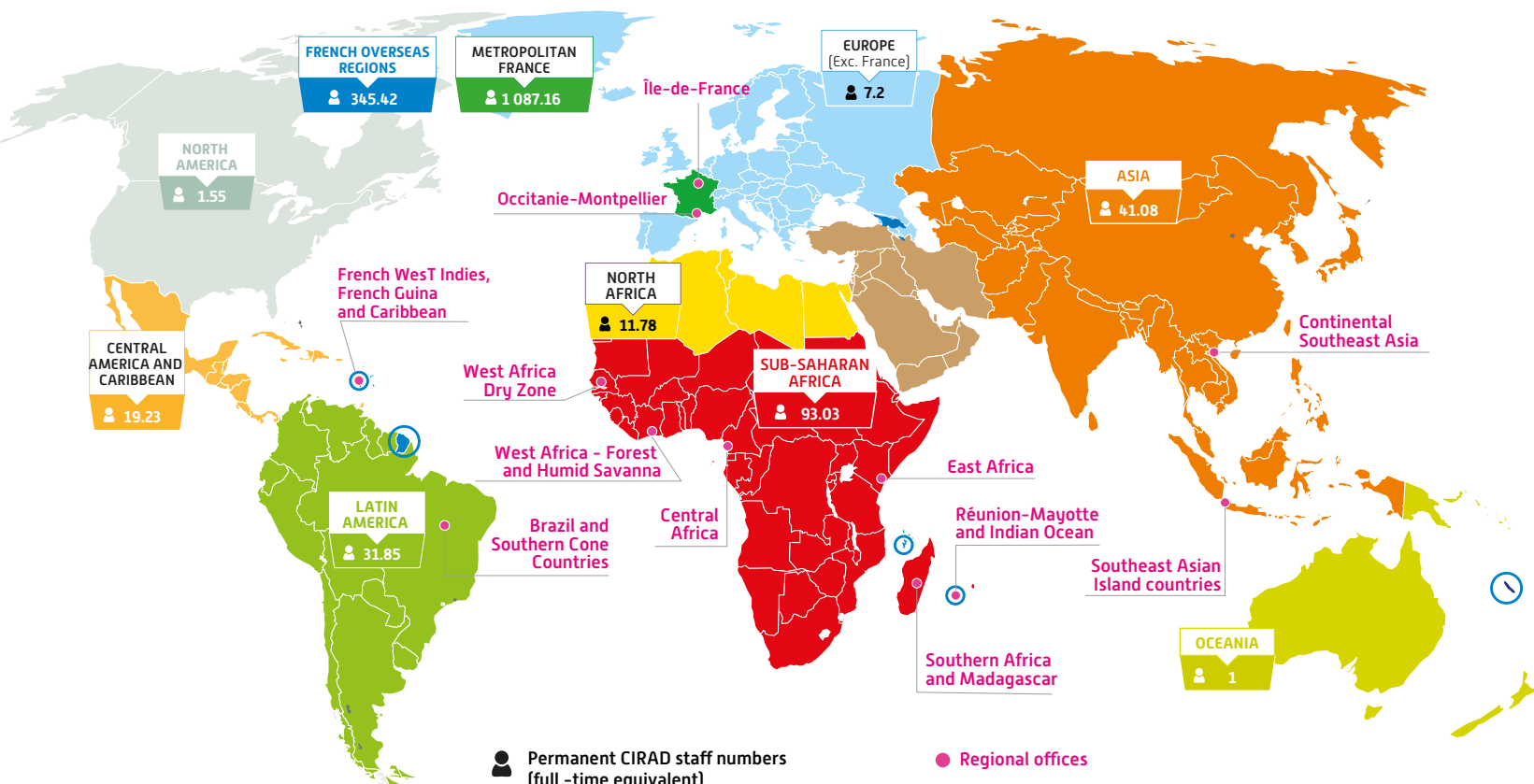
CIRAD's recognized expertise in agricultural issues in the South makes it a European reference in global scientific networks.

Its scientific operations respond to the needs of local populations and the main issues facing agriculture worldwide.

CIRAD is a targeted research organization that sees partnership as one of the cornerstones of its scientific strategy.

In Paris, our head office.
In Montpellier, a research, reception and training centre,
at the heart of an international scientific hub.

In the French overseas regions,
laboratories, collections, technical platforms and
experimental facilities that are unrivalled worldwide.



Data as of 31/12/2016. Source: SIRH - DG - CIRAD

Interview with Michel Eddi

CIRAD President Managing Director



Th. Erwin / CIRAD

During 2016, the HCERES conducted a new audit of CIRAD. What have you drawn from it?

Overall, the HCERES took a very positive, encouraging view of our organization; in particular, it highlighted our “novel, unique strategic positioning” and our “dynamic strategy, built over time”. This gives us good reason to continue along the same lines in our research and partnership building operations. It also confirms that our strategy and positioning satisfy our partners’ expectations, and those of the French authorities.

According to the HCERES, it is that very strategy, that positioning and their operational implementation, combined with the dynamism and commitment of both the establishment and its staff that allow CIRAD to fulfil the major role it is acknowledged to play within the international agricultural research for development network.

However, can we rest on our laurels and consider that we have fully achieved our objectives? Of course not! Firstly, because we have to improve our scientific output in all its forms, in terms of both quality and quantity, and ensure that it continues to evolve through the responses we strive to provide to the ever more complex problems affecting the South: major issues such as food security, population pressure, sustainable natural resource management, climate change and sustainable development in all its forms, environmental issues and migratory phenomena, and so on. Their complexity, the often unexpected ways in which they evolve, the conflicts of access and of ownership they trigger, and their very diversity, should push us to build our capacity to evolve and innovate.

This explains CIRAD General Management’s decision to rethink CIRAD’s strategy and the way in which it is implemented regularly, so as to pinpoint any necessary adjustments. This is what

The highlights of 2016

PRIORITY TO OUR PARTNERSHIPS WITH AFRICA

The meeting held in Montpellier in late December, with our main partners from Ivory Coast, Benin, Mali, Burkina Faso, Niger and Senegal, along with two regional organizations, CILSS and WECARD, was proof of the quality of our links with West Africa. The aim was to debate the priorities for the coming years in terms of agricultural development in the region, in the run-up to the upcoming drive to renew our platforms in partnership (dPs).

Above and beyond the quality of the debate, the fact that it was possible to hold such a meeting, the likes of which had not been seen for more than a decade, demonstrated the current confidence in CIRAD and the quality of its relations with the region.

Our partners were clearly delighted with the outcome, and we have decided to continue in the same vein in 2017 by scheduling another meeting, to be organized by WECARD along the same lines, in Africa this time.

“I am confident of our collective capacity to meet the challenges we face”

we chose to do towards the end of 2016: between now and the end of 2017, the strategic vision adopted in 2012 for ten years, and its operational implementation (SPSOs) are to be re-examined “at the halfway mark”. This operation is being led by the new Director General in charge of Research and Strategy, Jean-Luc Khalfaoui, supported by the entire management team. This operation will be of use to us in drafting the new contractual objectives that we will be negotiating with the State between now and the end of 2018.

Moreover, the war is far from won: there is still room for improvement in many areas, which were also highlighted by the HCERES. Along with some criticisms, notably concerning the risks of some of our activities becoming dispersed, our inadequate institutional communication policy, our role and our activities within the research landscape, and the gender imbalance in terms of both general recruitment and senior management, the HCERES also stressed the need to measure the impact of our activities. Above all, it singled out our economic model, which remains “highly fragile and risky”.

Indeed, from that last point of view, what impact do you think the development pact, which was introduced in 2014 to consolidate and transform our economic model, will have?

The development pact is an approach intended to serve our scientific and partnership strategy and objectives. It is designed to give us the means to implement that strategy in line

with our legitimate ambitions. It is a series of operations aimed at modernizing how the establishment’s scientific offering is constructed, combined with an in-depth analysis of the expectations of

the main research and development prescribers and donors. The aim is to create the necessary conditions to allow us to win new contractual resources, in order to consolidate the establishment’s economic model and foster jobs and skill building despite the current wave of retirements.

After a two-year phase of debate and construction, during which the establishment made a series of choices, the action plan for the pact was established in 2015. It aims to formalize what CIRAD has to offer in various fields (research, training, expertise, etc), and support the design of big projects and promote our offering more effectively to decision-makers in the various value chains. It means fine-tuning our donor strategies, to foster greater interest in CIRAD on their part and to ensure project design teams receive better support. It is too soon to judge the effects of the pact on the consolidation of our economic model.

This is a long-term goal, but the first encouraging results should push us to keep up our efforts. We all know that we do not have any choice but to implement this type of operation if we are to fulfil our ambitions. If not, more jobs will inevitably be lost. This would force us to give up on building skills at CIRAD and to downscale our ambitions and our scientific and partnership strategy. The way ahead is clear, and we will do all we can to succeed, while giving ourselves enough time to do so. I am confident of our collective capacity to meet the challenges we face.

A SINGLE COLLECTIVE LABOUR AGREEMENT FOR A NEW, MODERN EMPLOYMENT FRAMEWORK

After a long period of preparation and several months of negotiations with the unions, CIRAD General Management and three unions signed an agreement on the merger of the two previous labour agreements (one for metropolitan France and one for the French overseas regions). The co-existence of two agreements was looking increasingly obsolete, more than thirty years after CIRAD was founded.

The new agreement lays the foundations for a new, more modern employment framework that will, above all, apply to each and every CIRAD employee. The new framework also redefines the rules applying to geographical mobility between metropolitan France and the French overseas regions.

The aim is to foster employee mobility between the various CIRAD structures.

“IMPRESS”, TO ASSESS OUR RESEARCH RESULTS

For an applied research organization like ours, it is vital to assess the real impact of our research on development. To this end, CIRAD has developed a methodological approach called ImpresS (IMPact of RESearch in the South). The approach, which is participatory, was built on case studies in various countries worldwide. The cross-analysis of various past projects proved to be a mine of information. In particular, it highlighted the vital role of stakeholder capacity building and public policy in innovation processes all the way along impact pathways, which are necessarily long term.

With ImpresS, CIRAD is embarking on a new research approach, joining other organizations such as the CGIAR centres, INRA (ASIRPA) and the EU Impresa project, adopting common concepts and tools and tailoring them to its own specificities.



SPOTLIGHT 2016

TROPICAL SUPPLY CHAINS
AND SUSTAINABLE
DEVELOPMENT

Milking time at a communal farm
in the Merapi (Java) region of
Indonesia I. Vagneron © CIRAD

Interview...

Estelle Biénabe

AN ECONOMIST WITH CIRAD WHO HAS COORDINATED PROJECTS ON AGRI-CHAIN RESTRUCTURING IN SOUTHERN COUNTRIES. HER WORK COVERS QUALITY NORMS AND MARKET ACCESS FOR SMALL-SCALE PRODUCERS.

Agri-chains: a litmus test of sustainable development

“Sustainable development and tropical supply chains” was the spotlight topic chosen by CIRAD and the Agence française de développement (AFD) for 2016. A look back at some crucial issues for both CIRAD and society as a whole.



TELL US WHY THIS TOPIC WAS CHOSEN...

Estelle Biénabe: CIRAD's history is intimately linked to the development of tropical agri-chains. Those chains are currently in turmoil, and the associated scientific and partnership approaches are being revised, particularly in the English-speaking world. CIRAD saw the new global sustainable development agenda signed by the UN in late 2015 as an opportunity for a collective in-depth debate on the role of agri-chains.

WHY AND HOW ARE AGRI-CHAINS CHANGING AT THE MOMENT?

The global population and agricultural production are both growing, consuming ever more resources and generating waste and pollution. Against this backdrop, agri-chains are adapting by combining technical and social innovations. For instance, waste has become a resource, like the livestock production effluent now being used to fertilize sugarcane plantations. Agri-chains, which used to be linear and sectoral, are now interconnected, or even circular. In the light of growing environmental and social concerns, agri-chains are now regulated by new players and standards (sustainability and social responsibility norms, etc). This is transforming the relations between the private and public sector, and calls for increasingly sophisticated assessment tools.

WHAT WERE THE HIGHLIGHTS OF THIS YEAR?

We produced a collective work looking at agri-chains as vectors for development, regulatory spaces, innovation frameworks and objects of assessments. In addition to the CIRAD-AFD stand at the Paris International Agricultural Show, we worked with a wide range of partners to organize a lab debate to discuss our experiences of assessment at the European Development Days in Brussels, which bring together the whole development community. Lastly, the year culminated in the AC&SD international conference, at the interface between science, politics and society.

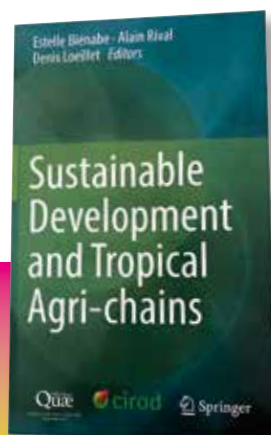
THESE OBSERVATIONS AND DEBATES ARE FEEDING IN-DEPTH RESTRUCTURING AT CIRAD...

Indeed. This long-term operation, coordinated by Patrick Caron when he was CIRAD Director General in charge of Research and Strategy, has three components: production and sharing of methodological tools; construction of scientific integration projects linking biological, technical and institutional systems; and specification of our relations with the private sector. This will enable CIRAD to draw up a charter setting out the rules for collaboration with private operators, which is particularly relevant now that the ambitious agenda set by the UN has called upon the private sector to join forces with governments and civil society in a global partnership. Agri-chains cover the relations between all the stakeholders involved from production to consumption: farmers, the agrifood sector, traders, retailers and consumers. ■

Agri-chains cover the relations between all the stakeholders involved from production to consumption: farmers, the agrifood sector, traders, retailers and consumers.

SPOTLIGHT 2016

In the light of the environmental and social concerns triggered by their expansion, agri-chains are increasingly behind new sustainable development approaches. This book summarizes the changes under way within tropical agri-chains. Those agri-chains link farming systems and other economic sectors, and in the light of growing concerns about the environment and social inequalities, they are experiencing substantial technical, economic and social change. CIRAD and the AFD are both witnesses to and supporters of the technical, biological and institutional changes the agricultural world and societies are going through. Based on their experiences as researchers and development agents, the book discusses agri-chains as vectors for development, innovation frameworks, objects of assessments and regulatory spaces. It is intended for anyone interested in these issues. ■



Sustainable Development and Tropical Agri-Chains

Estelle Biénabe, Denis Loeillet,
Alain Rival, coordinators,
Springer, 2016



CIRAD and its partners* organized an international conference, **Agri-Chains & Sustainable Development (AC&SD) in Montpellier from 12 to 14 December.**

More than 250 researchers, key development players and innovation specialists from more than 40 countries attended. The participants debated the role of agri-chains in relation to the new global framework resulting from the sustainable development goals (SDGs). Plenary sessions, forum theatre and interactive, participatory parallel sessions enabled the range of participants to analyse numerous innovations.

<http://acsd2016.CIRAD.fr>

* Agropolis International, Agrinatura, AgroParisTech, CGIAR and CGIAR Research Program on Policies, Institutions and Markets (PIM), University of Sussex (Institute of Development Studies), INRA, IRD, Montpellier SupAgro, Moringa Fund, RIMISP (Centro Latinoamericano para el Desarrollo Rural), Wageningen University and Research.

EVENTS 2016

27 FEBRUARY-6 MARCH, PARIS, FRANCE INTERNATIONAL AGRICULTURAL SHOW

The CIRAD stand, shared with the AFD and France Médias Monde, focused on supply chains and sustainable development: an exhibition for the general public and six round tables in partnership for anyone interested were organized with the AFD and RFI and streamed on YouTube. A brochure, "L'essentiel sur les filières and le développement durable", in French, with a print run of 10 000, was handed out to the public. CIRAD was also active in the media and on social networks throughout the show. The stand welcomed some twenty overseas delegations. A travelling exhibit of 18 posters in two languages (English and French) was produced for CIRAD's Regional Directors. The exhibit was also displayed in metropolitan France during the AC&SD conference.

16-18 MARCH, BALI, INDONESIA - ICOPE 2016

Sustainable Palm Oil and Climate Change: The Way Forward Through Mitigation and Adaptation. Conference organized by CIRAD, PT Smart Tbk and WWF.

31 MAY-1 JUNE, DIJON, FRANCE 1^{ER} RENCONTRES FRANCOPHONES SUR LES LÉGUMINEUSES

organized by CIRAD, INRA, Terres Univia and Terres Inovia.

15-16 JUNE, BRUSSELS, BELGIUM EUROPEAN DEVELOPMENT DAYS,

organized by the European Commission. Lab Debate on agri-chains and sustainable development, organized by CIRAD.

6-7 SEPTEMBER, KUALA LUMPUR, MALAYSIA 8TH INTERNATIONAL RUBBER GLOVES CONFERENCE (IRGCE)

of the Malaysian Glove Manufacturers Association (MARGMA). Serge Palu was invited to speak on the potential of alternative sources of natural rubber (guayule and Russian dandelion).

26-28 SEPTEMBER, MONTPELLIER, FRANCE - SRFG 2016 14th International Symposium on Rice Functional Genomics. Organized by CIRAD.

8-16 OCTOBER, MONTPELLIER, FRANCE FÊTE DE LA SCIENCE 2016.

CIRAD invited the general public to discover the range of cocoa and chocolate aromas.

10-14 OCTOBER, MONTPELLIER, FRANCE. PROMUSA-ISHS 2016,

X International Symposium on Banana, organized by Bioversity and CIRAD. Centring on agro-ecological approaches to promote innovative banana production systems.

EUROPE

A major federative project for agri-chains

The European Commission Directorate General for International Cooperation and Development (DG DEVCO) has ordered a major project from the Agrinatura Alliance. The project, entitled VCA4D (Value Chain Analysis for Development) and due to run for four years, is an assessment of 30 agri-chains in terms of their economic, environmental and social impact. The initiative specifically concerns micro, small and medium-sized enterprises in agriculture and related fields. CIRAD is heavily involved. A few details...



© J. Dusserre / CIRAD

The VCA4D project follows on from a study ordered from CIRAD in 2015 by DG DEVCO, on the sustainability of agri-chains in the South, and particularly on performance indicators. CIRAD was involved in a preparatory phase [choice of methods, feasibility study and field tests] in 2015, and then in drafting the final project proposal, for a second, operational phase. The proposal and the corresponding budget (€ 8M over four years for 30 agri-chains) were approved and a contract signed with Agrinatura at the start of August 2016. At the request of DG DEVCO, a project management team was set up in Brussels in September 2016, headed by a scientist from CIRAD, Marie-Hélène Dabat. Numerous researchers from CIRAD (and local partners) will be taking part in these studies of agri-chains in Africa, Asia and Latin America, in line with requirements identified by the EU's local delegations. Seven agri-chain studies have already begun, of which four involve CIRAD experts: palm oil (Sierra Leone), cassava (Ivory Coast), mango (Burkina Faso) and green beans

(Kenya). Future studies will cover the coffee, pineapple, citrus, rice, banana, sugarcane and livestock chains, among others, in different countries. The studies will be carried out within the Agrinatura consortium, which signed the contract with DG DEVCO and to which CIRAD belongs. All the establishment's economists, environmental assessment specialists and sociologists could be concerned. This major project makes an operational and scientific contribution to CIRAD's "Supply chains and sustainable development" operation, and provides an excellent opportunity to reconcile science and the search for funding, within a wide-ranging federative and multi-disciplinary study. CIRAD has a unique collection of data on agri-chains, in-depth knowledge of the field situation and of partners in the countries concerned, and an internationally recognised assessment capacity. As part of the operation, a researcher school is planned in 2017, notably to build a coherent CIRAD information system on agri-chains. At the same time, legal specialists are looking into the question of data ownership.

OUR RESEARCH

A FEW 2016 RESEARCH RESULTS REGARDING AGRI-CHAINS

BANANA

An improved banana reference genome sequence

After publishing the complete sequence for the banana *Musa acuminata* in 2012, CIRAD and its partners have now produced an improved reference sequence. Using semi-automatic bioinformatics tools, they conducted high quality assemblies that will serve to study this species, which is the origin of all edible banana varieties, in greater detail. ■



▲ Left: fruit with seeds from a wild banana plant.
Right: seedless fruit from a cultivated hybrid from the Cavendish group
© A. D'Hont/CIRAD

PARTNERS. BioNano Genomics (USA); Bioversity International (France); Commissariat à l'énergie atomique (CEA, France); Diversity Arrays Technology (Australia); Institute of Experimental Botany (Czech Republic)

FIND OUT MORE
Banana Genome Hub:
<http://banana-genome-hub.southgreen.fr>

▶ Landscape characteristic of an intensive high-altitude coffee production zone in Costa Rica. Coffee trees are grown in full sun and may be associated with Erythrinas, nitrogen-fixing trees, which are pruned to allow more sunlight to reach the coffee trees © C. Allinne/CIRAD

ECOSYSTEM AGRONOMY

Understanding coffee-based agrosystems

CIRAD's teams and their partners have used a systemic agronomy approach which takes into account diseases, pests, production and other ecosystem services to study the complex relationships between the different components of coffee-based agroecosystems in Costa Rica. This is the first time this kind of approach has been applied to tropical perennial crops. ■

PARTNERS. Centro Agronómico Tropical de Investigación y Enseñanza (CATIE, Costa Rica); Institut national de la recherche agronomique (INRA, France); Instituto Interamericano de Cooperación para la Agricultura (IICA, Costa Rica)



QUEEN VICTORIA PINEAPPLES

Simulating growth in line with climate

In Réunion, Queen Victoria pineapples are grown under varying climatic conditions, and with different fertilization and irrigation practices. This means that their development and especially fruit quality are highly variable. Their sweetness, which is very popular with consumers, may therefore be difficult for producers to predict. To enable them to manage their plots and the quality of their fruit better, a team from CIRAD recently simulated pineapple growth and sugar content at harvest according to climate and to cropping practices. ■

PARTNERS. Centro Agronómico Tropical de Investigación y Enseñanza (CATIE, Costa Rica); Réunion fruits et légumes, Pierrefonds (France)



© M. Darnaudy/CIRAD

All our research results on line on our website

www.cirad.fr/en > Our research > Research results

WEB-BASED DISEASE SURVEILLANCE

An interactive animal disease surveillance tool

Animal disease surveillance, especially early detection of emerging disease outbreaks worldwide, is one of the means of preventing diseases entering France. In view of this, CIRAD, ANSES and the French Directorate General for Food have created a web-based automatic disease surveillance system within the national epidemiological surveillance platform for animal health. The system, which has been under development since 2013, retrieves text data, extracts relevant information from it and reinterprets that information as spatiotemporal series and maps. Five tropical animal diseases are currently being monitored, but others could easily be integrated. ■

PARTNERS. Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail (ANSES, France); Direction générale de l'alimentation (DGAI, France); Ecole nationale vétérinaire d'Alfort (ENVA, France); Institut national de la recherche agronomique (INRA, France); Laboratoire d'informatique, de robotique et de microélectronique de Montpellier (LIRMM, France); Solutions numériques, matérielles and modélisation pour l'environnement et le vivant (NUMEV, France)

HEAT TREATMENT OF WOOD

Meeting industry's needs

Heat treatment of wood consists in heating it to a high temperature for several hours. This process gives the wood new chemical and mechanical properties, especially better resistance to decay. But those properties differ depending on the treatment methods; it is therefore essential to control the quality of treated wood. CIRAD and its partners have conducted a vast bibliographic review of methods for analysing the quality of heat treated woods, their advantages and disadvantages and, above all, their potential for industrial use. ■

PARTNERS. Laboratoire d'étude et de recherche sur le matériau bois (LERMAB); Laboratoire bourguignon des matériaux et procédés (LaboMaP); Institut national des recherches en génie rural, eaux et forêts (INRGREF)

LIVE POULTRY TRADE

How can we stop the spread of avian influenza?

In Mali, live poultry markets are supplied by a multitude of small village farms. Poor hygiene standards and animal overcrowding are highly conducive to the transmission of diseases such as Newcastle disease and avian influenza. How can the risks be limited? Based on a vast survey of markets in the country, researchers from CIRAD and their Malian partners have come up with simple, inexpensive measures to remedy this situation. ■

PARTNERS. Institut d'économie rurale (IER, Mali); Royal Veterinary College (UK)

✓ Poultry market in Mali © S. Molia/CIRAD





Discussion of the merits
of different wheat varieties
in a trial plot in Morocco
P. Dugué © CIRAD

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TAKING ACTION
NOW

STRATEGIC VISION

CIRAD drafted a ten-year strategy in 2012, aimed at making research a true tool for development. In 2015-2016, an audit by the independent assessment body HCERES allowed CIRAD to measure the progress made and assess the strengths and weaknesses of that strategy. At mid-term, the decision was taken to revise it, to take into account the results of the audit and the intervening changes in the context of its research.

STRATEGIC ORIENTATIONS

CIRAD consults its partners

CIRAD drafted a ten-year strategy in 2012, aimed at making research a true tool for development. In 2016, it asked its longstanding partners in West Africa to think about how its research in partnership offering could be adjusted for the coming decade, and about how it fits in with the Sustainable Development Goals (SDGs). It has worked with those partners on a joint analysis of the issues and fields of intervention, the priorities and the adjustments to be made to how partnerships are structured, notably through the platforms in partnership for research and training (dPs).

Representatives of national research centres in Benin, Burkina Faso, Ivory Coast and Senegal, sub-regional organizations – Comité inter-États de lutte contre la sécheresse au Sahel (CILSS) and West and Central Africa Council for Agricultural Research and Development (WECARD) – were in Montpellier on 15 December. There were also representatives of the

French Ministries of Research and of Foreign Affairs, the Agence française du développement (AFD) and the Institut de recherche pour le développement (IRD). Discussions centred on topics as varied as how to obtain reliable experimental data with a view to developing models, innovation, impact assessments, and donor expectations.

"I think this consultation is a very good idea, to talk face to face with CIRAD, as part of the grassroots approach it has been working on with us for such a long time."

Youssef Camara,
Director of Research and
Innovation, WECARD, Senegal.

PRAISE FOR COOPERATION AND PARTNERSHIPS

The partners insisted on the need for academic and professional training for researchers and farmers, with ongoing support from international aid. They acknowledged the efficacy and relevance of the platforms in partnership for research and training (dPs), of which there are five in West Africa, which could be tied in with other organizations in the region (WECARD national centres of specialization, CGIAR Research Programmes, IRD joint international laboratories, etc), and discussed the merits of promoting other types of cooperation (thematic networks, regional networks) while systematically ensuring strong political backing and impact in terms of donors. To convert this shared vision into operational future scenarios, another meeting could be organized under the aegis of WECARD in 2017. ■

NEW FACES IN OUR RESEARCH AND STRATEGY DIVISION

Jean-Luc Khalfaoui, new Director General in charge of Research and Strategy, has replaced Patrick Caron. He has a PhD in genetics, and is a former Head of European and International Relations at CIRAD and Research Programme Officer for Applied Life Sciences at the European Research Council (ERC), and took up his post on 1 September.



The new Associate Director General, **Magalie Lesueur Jannoyer,** has replaced Estelle Biénabe. She has a PhD in Agronomy from INA-PG, and more than 15 years' experience of managing projects on tropical horticultural systems. She has worked with national and international centres, and is also an adviser to the Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail (ANSES) and a member of the International Society for Horticultural Science (ISHS) Council. ■



TRAINING

Scenarios for a new ambition

Capacity building among partners in southern countries is key to development through research. In line with its new strategic vision, CIRAD asked Marion Guillou*, President of the Board of Directors of Agreenium, to look at how the establishment might strengthen its training operations. The possible scenarios are presented below.

CIRAD has been working for many years on activities relating to training in and through research: 45 full-time equivalents are involved each year in higher education operations, and 400 PhD students were supervised in 2016, 57% of them from southern countries. The creation of the Agreenium consortium (French Agricultural, Veterinary and Forestry Institute) has enabled CIRAD to strengthen its links with French specialist higher education establishments and work with them on training projects in the South.

TRAINING, A NEW AMBITION AND FIVE SCENARIOS

The growing demand for training from southern countries is a strategic priority for CIRAD. The report suggested five scenarios that would enable the establishment to achieve that ambition. Some could be combined:

1. Improving organization and strengthening alliances.
2. Building its professional training activities within a specific structure, promoting

its training to private, public and associative stakeholders.

3. Encouraging its experts to involve themselves in courses organized with other players (Institut Pasteur, Agreenium, CNAM, WUR, etc).

4. Using the Montpellier University of Excellence [MUSE] I-site to build a joint offering with establishments awarding qualifications for the South and boost the attractiveness of Montpellier on the international stage.

5. Building joint undergraduate and post-graduate courses with establishments in the South, hand in hand with Agreenium and the MUSE project.

BUILDING CAPACITY IN THE SOUTH

The report's authors suggested stating more clearly in the upcoming contractual objectives the importance of training and capacity building for the South. In this case, taking account of demand from economic players in the South to steer construction of basic training for future graduates (including partners from the South, in coordination with the other members of Agreenium), and also what it has to offer in

terms of professional training (including for senior staff and development agents in the field); building a training engineering platform, "Cirad-Formations Innovantes" to promote its offering economically; and stepping up investment in the online courses offered by the "AgreenU" virtual university led by Agreenium.

The report insists that CIRAD's priorities should be defined in line with those of the countries concerned, the AFD and multilateral development funding agencies. Lastly, it stresses the need to use long-term institutional partnerships to support the professional training courses on offer. Not forgetting continuing to invest in training engineering and teaching tools with Agreenium.

* Assisted by Jean-Louis Barjol (CGAER, Ministry of Agriculture, Food and Forestry), Magali Dufour [CIRAD] and Sacha Kallenbach [IGAENR, Ministry of Education and Research].

Metrology and quality teaching in the Mediterranean

The AFREQEN project applies the topics of quality and metrology to renewable energies, from North to sub-Saharan Africa. It fits in with a drive launched in 2014 by the European QESAMED training programme, focusing on the French-speaking Mediterranean Basin. A specialist Masters in "Metrology and Quality", co-led by CIRAD and the Conservatoire national des arts et métiers (CNAM), was launched in September 2016 at Cadi Ayyad University (Marrakech). It uses the training modules produced as part of QESAMED and has the support of the Agence universitaire de la francophonie. In the medium term, the aim is to develop an international Euro-African training structure.

Students of the first "Metrology and quality" specialist masters course, Cadi Ayyad University, Morocco



© UCA

STRATEGIC VISION

CHRISTINE CHERBUT, Chair of the CIRAD Science Council

Christine Cherbut was appointed Chair of the CIRAD Science Council in 2016. She will head the consultative body for three years, replacing Gilles Boeuf. After a few months in the post, Christine Cherbut looks back on her appointment and evokes the prospects for the future.

Michel Eddi asked you to head the CIRAD Science Council. Why do you think that was?

In particular, I think Michel Eddi offered me the job because CIRAD will be looking more closely at food systems in their entirety in future. This systemic approach, from agricultural production to food consumption, is gaining ground all over the world. I come from INRA's Food Division, where I have acquired a good idea of how agricultural products are used. For my part, heading CIRAD's Science Council is an exciting opportunity. I think the establishment's partnership-based approach and openness to the world as a whole are particularly relevant in the current context of global challenges. Moreover, this experience should also teach me a lot, since the CIRAD Science Council represents a very wide range of cultural backgrounds and skills.

What is the aim of your mission?

A dual one: giving a collective, independent opinion on questions posed by CIRAD, on the one hand, and enlightening the establishment on scientific topics suggested by the Council itself, on the other. Furthermore, I am firmly of the belief that Science Council meetings should also be an opportunity to interact with CIRAD staff members. We began doing this at our first meeting, in November 2016, when three researchers presented various incentive operations supported by the



"The Science Council has to interact with CIRAD staff members."

establishment. Along the same lines, we are organizing an open workshop in June 2017 entitled *"Révolutions des sciences et techniques: impact sur la recherche au CIRAD"* (Science and technology revolutions: impact on research at CIRAD). The aim is to make sure that the Science Council remains "grounded", not working solely with CIRAD management.

How do you see this mandate going?

The first two years are set to be busy, and should have real effects on CIRAD strategy for the coming years. One of the Science Council's main tasks will be to give its opinion on the establishment's new strategic vision. It will then be making a statement on CIRAD's scientific and partnership strategy objectives. I also already know that the Science Council is going to be asked what it thinks of the stepping up of CIRAD's "innovation-impact" project, launched in 2011, and its foresight study activities. We will have lots to think about! ■■■

ANIMAL HEALTH ASTRE, a new research unit

The "Animal and Integrated Risk Management" and "Emerging and Exotic Animal Disease Control" research units merged on 1 January 2017 to form ASTRE (Animals, Health, Territories, Risks and Ecosystems), a new joint research unit working to foster an integrated animal health approach. Its aim is to improve animal health, public health and food security in the South, notably against a backdrop of global change and transitions within socio-ecosystems. The main challenge is to develop an integrated health approach: inter-sectoriality and interdisciplinarity centring on animals, ecosystems and territories, in line with the One Health and EcoHealth approaches. Two CIRAD staff members, Thierry Lefrançois and François Roger, head the new unit. ■■■



BIOGRAPHY

Christine Cherbut is 56, and is currently Deputy Director General for Scientific Affairs at INRA, after being Scientific Director for Food, Nutrition and Bioeconomy. She has a PhD in Animal Physiology, and has previously headed a research unit, been Vice-Chair of an AFSSA expert committee, and Head of Nutrition and Scientific Support at Nestlé.

GENERAL AGREEMENT

CIRAD confirms
its partnership
with MAAF

CIRAD and the French Ministry of Agriculture, Food and Forestry (MAAF) signed a new six-year general collaboration agreement in Paris on 12 October 2016, at a meeting chaired by Minister Stéphane Le Foll. Global change, particularly climate change, and its impact on the agricultural sector and food security, are a major concern for the ministry, which is relying on CIRAD and its expertise to come up with solutions for the French overseas regions and elsewhere.



▲ Zebu, Mayotte © Aylerein / Adobe Stock

“The content of the agreement and the range of subjects it covers reflect the exceptional quality of the relationship between the two parties”, Michel Eddi stresses. “That relationship is marked by great trust and by a shared vision of the issues and of the solutions required to support agriculture in the French overseas regions and worldwide. The successful launch, at COP21 in Paris, of the 4P1000 initiative led by the Ministry of Agriculture, an international programme in which CIRAD is actively involved, exemplifies that collaboration”.

SUPPORTING TRANSITION

The general agreement guides joint operations by CIRAD and MAAF in the French overseas regions (DOM) and elsewhere, centring on several priorities.

IN THE DOM. Focus on forests, agro-ecology, health risks and agricultural development through innovation

- Forest management. CIRAD is helping establish a new generation of tropical forest ecosystem management plans, by leading logged tropical forest monitoring and measurement networks.
- Deployment of the agro-ecology plan for France. CIRAD will be sharing its work with stakeholders in and partners of the plan,

with a view to achieving the objectives of the eight plans of action (on ecoantibiotics; ecophytosanitary products; seeds and sustainable agriculture; apiculture; energy, methanization and nitrogen self-sufficiency; organic ambitions; plant proteins; and agroforestry). MAAF and CIRAD are also working on the overseas component of the 2015-2020 agroforestry development plan, in conjunction with local stakeholders. Management of genetic resource collections of interest to tropical countries is another major priority for CIRAD as part of its collaboration with MAAF.

- Health risk management. CIRAD is involved in the global One Health human and animal health approach, and intends to broaden it to include ecosystem and plant health and biodiversity. This also includes working to cut chlordecone pollution and on the Ecophyto II plan to reduce the use and impact of phytopharmaceutical products.

Moreover, at the request of MAAF, CIRAD is involved in the second phase of implementation of Technical Innovation and Agricultural Transfer Networks (RITAs) for the period 2016-2020: it is a national and regional technical and financial leader for RITA scientific management and can provide financial engineering support for project management.

OVERSEAS. Understanding the changes in farming systems worldwide

CIRAD is continuing its research on public policies in favour of family farming in partner countries in the South. CIRAD, along with the FAO, signed an agreement in 2011 involving MAAF and the French Ministry of Foreign Affairs for the establishment of a World Agriculture Watch (WAW, see article on page 19).

The government has asked the AFD to move into new fields, such as governance, higher education, and research. This request was prompted by a decision by the Interministerial Committee for International Aid and Development (CICID) to “help build scientific communities and higher education in developing countries”. CIRAD has made a substantial contribution to this new French ambition, notably by producing a document: *Development through research: France’s ambition for scientific diplomacy*.

CIRAD is now the AFD’s leading French partner in terms of research

DONOR STRATEGY

An incubator to promote innovations

By Lisa Blangy,
Head of Product and Service
Development, Technology
Transfer and Development
Service

"In 2016, for the first time, the "products and services" incubator supported 19 innovations chosen following a call for ideas. The projects supported include a web portal for easy mapping of watch data, a vaccine against ehrlichiosis, and a programming language for simulating landscape dynamics.

Through the incubator, we can offer three types of specific support: legal and intellectual property expertise, economic and promotional development backup, and financial leverage. After these first success stories, we are repeating the call in 2017!"



© M. Adell / CIRAD

Since 2014, CIRAD has changed its strategy as regards donors.

The aim is to understand donor expectations better, so as to adapt its research, expertise and training products. Specific incubators have been launched to this end.

BIG PROJECT INCUBATOR

Seven proposals selected

THE **BIG**
PROJECTS

After submission to a selection committee involving numerous research units and platforms in partnership for research and training (dPs), twelve project proposals out of 26 have been pre-selected to join the CIRAD Big Projects incubator. Seven were sufficiently advanced for the incubator to provide them with additional resources and specific internal support aimed at convincing donors and partners to support them.

List of projects

BIOPHORA > Boosting genetic and biological control of disease vector insects and pests.

BOOST > Developing a collaborative platform to foster the agro-ecological transition in developing countries.

GITES > Promoting integrated management of semi-arid zones in the Sahel by associating irrigated, flood recession and rainfed zones.



G. Piombo © CIRAD

BIOSTAR > Producing renewable energy from biomass for small agrifood and forestry firms in rural parts of West Africa.

TAMA > Establishing an agro-ecological market garden supply chain in West Africa to ensure a healthier diet.

MATRICE > Generating added value for cocoa- and coffee-based agroforestry systems for smallholders in Central America. EU, Horizon 2020 funding.

WILDMEAT > Helping conserve wildlife, ecosystems and the services they render so as to improve the living conditions and food security of rural communities in ACP countries. EU, DG-DEVCO funding.



© C. Fargeot / CIRAD

WHO ARE OUR DONORS?

In order to target them more effectively, CIRAD has created a new post: donor family manager. Five main donor families have been identified: public development donors, research donors, private development donors, private agri-chain donors, and French overseas regions donors.

BREEDCAFS has been selected by H2020



**BENOÎT
BERTRAND**

Agroforestry is one way for the coffee supply chain to adapt to climate change, but few coffee varieties are suitable.

The EU Horizon 2020 programme has selected BREEDCAFS, a CIRAD-led project, to broaden the range of varieties available for this more sustainable production method.

Europe, the world's largest coffee consumer, is worried about the long-term threat to supplies as a result of climate change. This is one of the reasons that prompted the EC research and innovation programme, Horizon 2020, to select the Breeding Coffee for Agroforestry Systems (BREEDCAFS) project.

"The aim is to develop productive varieties tailored to agroforestry and to European roasters' requirements", Benoît Bertrand, a geneticist with CIRAD who is coordinating BREEDCAFS, explains. Twenty partners from the worlds of academia and agriculture and the private sector are associated with this promising project led by CIRAD, which has a budget of 4.5 million euros. Several internal operations at CIRAD ensured the success of the project: a debate to assess the impact of the research and the launch of incentive operations centring on the Big Projects.

Developing productive varieties suitable for agroforestry

Hybrid coffee trees produced by CIRAD will be tested in various environmental conditions.

"The idea is to determine the molecular mechanisms of suitability for agroforestry and pinpoint candidate genes for breeding highly productive varieties suited to agroforestry", Benoît Bertrand adds.

Creating a new supply concept

One other aim is to link European roasters and coffee producers, with a view to understanding why they adopt or reject new

varieties. To reconcile the interests of the various stakeholders, researchers will be developing a new concept of supplying 100% traceable, quality coffee produced in agroforestry systems, which is carbon-neutral and for which producers are paid a fair price. Two clusters are to be tested in Vietnam and Cameroon, along the lines of a prototype developed on 1300 ha of agroforest in Nicaragua.

Re-thinking global governance of coffee varietal improvement

Agroforestry accounts for 60% of the area under Arabica coffee worldwide. The farmers involved are mainly smallholders who do not have access to quality planting material suited to the specific constraints of this type of system. *"We are keen to re-think global governance of coffee varietal improvement operations, in conjunction with World Coffee Research", Benoît Bertrand explains. "The aim is to establish mechanisms to promote, disseminate and share new varieties suited to agroforestry."*

Partners

Industry > Illy Caffè Italy, Eurofins, Arvid Nordquist.

Academia > UCPH, Galway Univ., IRD, CIRAD, Lisbon Univ., Montpellier Univ., Nova ID FCT, Max Planck, Forschungszentrum Jülich GmbH Germany, NOMAFSI, AGI, ASU.

Professional organizations and NGOs > WCR, ICRAF, Nicafrance Foundation and SNV.



D. Guard © CIRAD

Five CIRAD proposals have been chosen. Of the thirty or so proposals submitted by CIRAD in response to the H2020 programme's 2016 call for projects, five were selected for funding. CIRAD is coordinator of one of the projects, BREEDCAFS (see article). Furthermore, along with INRA, CIRAD participated in a collective lobbying drive that resulted in a decision to issue a call for projects in support of the 4P1000 initiative. CIRAD and INRA have submitted a joint proposal in response to that call, which is due to be assessed in the first half of 2017.

IMPACT OF RESEARCH

How does CIRAD's research in partnership contribute to sustainable development in southern countries? In choosing a participatory approach to analyse the impact of its research, CIRAD is hoping to understand the preconditions for development better. It is adopting concepts and tools and adapting them to its own mandate, while promoting the "impact culture" internally.

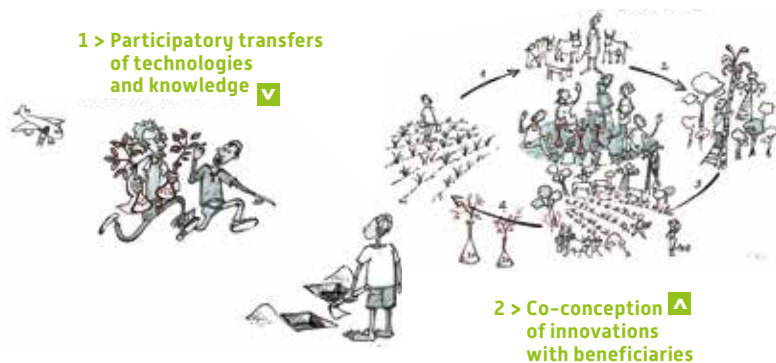
THE IMPRESS METHOD

Initial conclusions

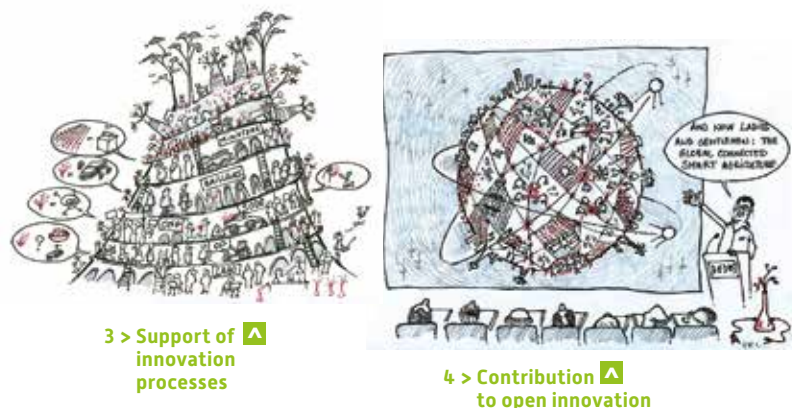
CIRAD's methodological approach, ImpresS ("IMPact of RESearch in the South") is based on case studies of innovations in various world regions. It centres on stakeholder participation, and enables a comparative analysis of case studies, distinguishing between four models of research involvement. In this way, it highlights the crucial roles of stakeholder capacity building and public policy in innovation processes, and has produced novel, and even unexpected, results.

If research is to have an impact in southern countries, it has to intervene on various levels: knowledge generation and dissemination, co-conception of innovations, management of resources linked to projects, capacity building, stakeholder support, and promotion of innovation. An analysis of case studies served to identify four models in which research plays a more or less important role in innovation processes:

1 > Participatory transfers of technologies and knowledge ✓



2 > Co-conception of innovations with beneficiaries ▲



3 > Support of innovation processes ▲

4 > Contribution to open innovation ▲

INTERACTION BETWEEN RESEARCH AND STAKEHOLDERS IS VITAL

Interactions throughout the innovation process result in a range of research outputs: knowledge, methods, technologies, experimental networks, etc. They foster the use of those research outputs by stakeholders and changes in those stakeholders' practices (outcomes) through new organizational methods, training programmes, and drafting of new norms or public policies. Policy-makers play a key role in the construction, development, dissemination and rollout of innovation.

THIRTEEN CASE STUDIES WORLDWIDE

The ImpresS method was built on thirteen case studies covering between fifteen and thirty years. Each case was analysed using participatory methods, with scientific partners in the South and development players. It is the in-depth *ex post* analysis of research impact pathways over long periods that explains in detail how research operations affect development.

HINTS FOR RESEARCH

A transverse analysis of the case studies revealed various generic pointers.

1. Innovation is sociotechnical in nature. **2.** Impact on development is always long term. **3.** It is essential to co-produce research results (outputs), and also their adoption by stakeholders (outcomes) with various types of players. **4.** Stakeholder capacity building based on formal or informal learning systems is vital at every stage of the process, and is a determining factor in the success of innovation. **5.** Interactions with public players and policy-makers are essential, but take various forms and intervene at various stages of the innovation process. **6.** Original types of impacts have been measured: they can be classed in eleven groups relating to the five Sustainable Development Goals (SDGs) most relevant to CIRAD*. **7.** Research has a range of different roles. ■

* **SDG1** No poverty. **SDG2** Zero hunger. **SDG12** Responsible consumption and production. **SDG15** Preserving terrestrial ecosystems. **SDG17** Partnerships for the goals.



<http://www.un.org/sustainabledevelopment/fr/>
<http://impress-impact-recherche.CIRAD.fr>

THE CIRAD-INRA ETHICS COMMITTEE IS ENCOURAGING AN "IMPACT CULTURE"

Assessing the real impact of research is one expression of the social and environmental responsibility of research establishments, and should be done before, during, and at various stages after research operations.

The committee's ninth statement made six recommendations stressing the merits of relying on national research alliances to assess impact, conduct collective impact appraisals, and encourage stakeholders to participate. ■

World Agriculture Watch is firmly installed at the FAO



**ALAIN
BILLAND**

It has been a long time coming, but the World Agriculture Watch (WAW) initiative thought up by CIRAD almost ten years ago is now firmly installed at the FAO, supporting application of the Sustainable Development Goals (SDGs) adopted by the international community.

After pilot operations in eleven countries, a global assessment and an external review, it's all systems go. World Agriculture Watch (WAW) is now firmly installed in the FAO building in Rome, and will be extending its operations to other countries over the next two years.

Understanding changes in farming systems

WAW gathers data on structural changes in farming systems worldwide, their dynamics and their impacts. Those changes may relate to land tenure regimes, new forms of employment, or market integration. *"The most commonly used parameters, such as farm size or farmers' incomes, are too static"*, Alain Billand, Departmental Director at CIRAD and WAW adviser, explains. *"The methodological approaches developed by*

WAW have proved to tally with the FAO's new strategic requirements, and also those of the pilot beneficiary countries, which have rapidly adopted the proposed approaches."

A watch to support development

The initiative, which came from the world of research, has become a real tool for development. *"In Vietnam, WAW has served to build capacity in terms of agricultural statistics"*, Guillaume Duteurtre, the watch correspondent in Vietnam for CIRAD, stresses. In Madagascar, an integrated information system and monitoring mechanism have been established. The new data that can now be gathered help the authorities to study changes in their farming systems and their performance in terms of socioeconomic and environmental viability. This information is of value for fine-tuning public policy, for

instance as regards awarding grants, organizing groups and associations or launching specific types of agricultural insurance.

Assessing the contribution of agriculture to global issues

Agricultural and food security issues no longer only concern the agricultural sector; they fit into the global issues identified in the UN Sustainable Development Goals (SDGs). The FAO is therefore on the lookout for new indicators capable of assessing the sustainability of farming systems and their contribution to poverty alleviation, climate change, employment and migration issues, resource management, etc. The French Ministry of Foreign Affairs' assignment of a technical assistant marks the start of a new two-year phase aimed at consolidating the initiative by opening it up to a wider community of partners. ■

CHRONICLE

2007

A forerunner of WAW, launched by CIRAD, sets out to observe changes in agricultural practices and dynamics worldwide.

2011

WAW is officially launched and hosted by the FAO, with the support of the French Ministries of Agriculture and of Foreign Affairs. CIRAD researchers are working on a methodology centring on a new typology of the different types of agricultural production*

2013

IFAD joins the initiative and thanks to CIRAD's network of partners, pilot operations are launched in eleven countries: Argentina, Brazil, El Salvador, France, Madagascar, Malawi, Nicaragua, Niger, Senegal, Tunisia and Vietnam.

2016

The cooperation agreements expire, and it's time to take stock. The results are very positive and demonstrate considerable interest on the part of the countries involved in the initiative. WAW consolidates its installation at the FAO and will be expanding its network worldwide.

* Subsistence farming, commercial family farms, family farms using hired labour, subsistence farming using hired labour, patronal farms and corporate farms.

CIRAD's operations fit within the overall framework of the Sustainable Development Goals (SDGs), in line with its mandate of research for development in southern countries. Agriculture is increasingly looking like a major lever for action in terms of making the necessary transitions. CIRAD helps stakeholders find appropriate innovations, international partnerships and public policies.

PRIORITY PROJECT

CIRAD and INRA are working for agro-ecology

Agro-ecology is a scientific priority for both CIRAD and INRA. In both North and South, the agro-ecological approach is key to the development of sustainable, versatile farming systems and sustainable food systems. With this in mind, in addition to the topic of agro-ecology in its strictest sense, CIRAD and INRA have identified five complementary lines of research that will support the study and implementation of the agro-ecological transition: functional biodiversity, the main bio-geochemical cycles, landscapes and territories, production systems, and innovation systems.

For CIRAD and INRA, agro-ecology is a way of switching to sustainable, versatile farming systems, in both northern and southern countries.

It is a scientific priority that fits in with:

- societies' expectations;
- sustainable development issues in the light of global change;
- public policy in France (agro-ecology project) and various southern countries, in favour of agro-ecology;
- international initiatives such as those of the UN (Sustainable Development Goals) and the FAO, to promote sustainable production.

In the West Indies, service plants are used to regulate banana pests by modifying their food web © R. Domergue / CIRAD



IN INDUSTRIALIZED COUNTRIES...

High agricultural productivity has meant biodiversity losses, standardization, increasingly artificial landscapes, and pollution (soil, air, water). The aim is to strike a better compromise between agriculture and the environment in a context of modernization, homogenization and specialization, in which 2.5% of the population work in agriculture.

IN THE SOUTH...

Many countries are facing contrasting climates, a population explosion and a lack of investment. Rural employment and poverty are major development issues. The aim is to help small-scale family farmers adapt to climate change without reproducing some of the deadlocks resulting from productivist models..

A rapidly developing research topic

Agro-ecology is often seen as a cross between ecology and agronomy, with a view to designing and managing sustainable agro-ecosystems. It also calls upon the economic and social sciences in order to come up with versatile systems and foster their deployment through appropriate public policy and support. For both organizations, agro-ecology is a rapidly developing research topic, with almost 450 articles referenced in 2014.

LAND USE

The Agrimonde-Terra foresight study

How could land use throughout the world change by 2050?

The Agrimonde-Terra foresight study, conducted by CIRAD and INRA, launched a debate on five regionalized scenarios of land use throughout the world. The results of the study, presented in Paris on 24 June, highlighted the main levers for action, particularly the need for global governance of land use, placing the agricultural and food sectors on a par with other economic sectors.

Agrimonde-Terra, launched in 2012, suggests scenarios for changes in land use (agricultural potential, accessibility, intensity of use and services rendered) and their consequences for food security. Researchers from CIRAD and INRA and their partners identified what causes changes in land use. This approach echoes the four dimensions of food and nutritional security (availability, access, use and stability).

GRADUAL CHANGES IN TRENDS OR A SUDDEN BREAK?

Five scenarios were then drawn up, by combining various hypotheses: three trend-based scenarios and two others based on sudden breaks, involving radical changes in land use. Those scenarios were illustrated for fourteen world regions. The first, "Metropolization", describes the continuous growth of cities, whose inhabitants consume ever greater volumes of animal and/or processed products; no attempts are made to mitigate climate change; smallholders are marginalized. The second, "Regionalization", recounts how the growth of medium-sized towns and their interconnection with rural areas can lead to the emergence of regional food systems, based on family farms and traditional foods. The third, "Households", describes how hybrid diets develop, based on both traditional

and modern supply chains, with agricultural land primarily managed by family farms and cooperatives. Lastly, the other two scenarios centre on breaks. One, "Healthy", assumes that the cost of malnutrition will result in a switch to healthy diets, fostered by global cooperation and public policy, within a context of climate change stabilization and reconfiguration of farming systems. The other, "Communities", describes how recurrent crises may foster the development of small towns and communities in rural areas, whose aim would be to pool agricultural ownership so as to guarantee food security.

A TOOL TO FOSTER DIALOGUE

Regardless of the scenario, international trade will be vital to ensure global food security for the 9.7 billion people or so on Earth by 2050. In North Africa, the Middle East, sub-Saharan Africa and India, the joint effects of population growth, poor agricultural performance and insufficient food supplies will have increased land use pressure and limited food security. Remedying that situation will mean making major systemic changes, introducing strong public policies, and ensuring concerted action by a range of players. Agrimonde-Terra could facilitate dialogue between the various stakeholders, as shown by its recent use in Tunisia, at a foresight workshop: within a few days,



▲ Agricultural land in North Africa
© Twixx / Adobe Stock

local players were able to build land use scenarios that served as a basis for discussion with a view to steering agricultural strategies.

CLIMAT

What came out of COP22

Emmanuel Torquebiau, CIRAD Climate Change Officer, sums up this COP for action.



© CIRAD

The 22nd UN Climate Change Conference (COP22) left in its wake a greater role for agriculture, with two initiatives, from Morocco: AAA, "Adaptation of African Agriculture", and from France: "4P1000: soils for food security and climate".

declaration made at COP22 calls upon developed countries to strike a better balance between funding for mitigation and that for adaptation. However, for want of an overall agreement on the respective shares for adaptation and mitigation, talks on this funding have been postponed, to resume in Bonn during the technical negotiations scheduled in the spring of 2017.

As regards agriculture, what message did France try to put across at COP22?

The Ministry of Agriculture and French research organizations presented the "4P1000: soils for food security and climate" initiative, which aims to boost soil carbon contents worldwide in order to compensate for greenhouse gas emissions and at the same time to improve food security. Almost 200 participants from 37 countries have signed up to the initiative. The 4P1000 research group (INRA, CIRAD, IRD, CGIAR, and Ohio State University) led the scientific debate, with the first meeting of the 4P1000 Scientific and Technical Committee in Marrakech. ■■■



© Françoise Bro / Adobe Stock

▲ Palms and snow on the Atlas Mountains... but how long for?

Emmanuel Torquebiau, what came out of COP22?

Morocco made COP22 the "COP for action", by calling on stakeholders – countries, firms, investors, cities and regions – to come up with concrete proposals. The ratification of the Paris agreement (COP21) by the minimum number of countries (113 countries had ratified it as of 24 November), representing at least 55% of global emissions, meant that it was officially in force as of 4 November, sooner than planned.

What about the specific aid mechanisms planned for developing countries?

The Paris agreement specified that funding for developing countries should concern both mitigation and adaptation, significantly increasing funding for adaptation, a vital detail that developing countries are following closely. The final

What is the current role of agriculture in climate talks?

Agriculture first appeared in climate talks in 2015, when the Paris agreement mentioned food security for the first time. The most visible aspect of the readjustment at COP22 was the AAA (Adaptation of African Agriculture) initiative, launched by Morocco. The aim is to help African farming systems cope with the adverse effects of climate change by highlighting four topics: soils, water, risks and funding, in line with the Sustainable Development Goals.

Ahead of COP22, CIRAD participated on 28 October in the press conference held to launch a collective work by the AllEnvi Alliance, "The Mediterranean Region Under Climate Change – A Scientific Update". CIRAD coordinated the section on "Agricultural management, livestock and food security", which involved more than 150 authors working to understand the mechanisms of climate change and its impacts and to make recommendations for the Mediterranean, one of the most exposed regions. The book was presented during COP22.

CIRAD, along with its partners, was involved in numerous events at COP22, from 7 to 18 November in Marrakech. A synopsis of the work done by CIRAD on carbon capture in African soils was presented by Marc Corbeels at an event organized by the "4P1000" research group and at another on carbon capture by agricultural soils, co-organized the same day by INRA Morocco and CIRAD. ■■■

WORKING TO FIGHT CLIMATE DISRUPTION

In Le Monde.fr dated 18 November, CIRAD President Managing Director Michel Eddi, IAVFF-Agreenium President Marion Guillou and INRA President Philippe Mauguin spoke with one voice in calling for action against climate disruption. According to them, "agriculture is part of the problem, but also of the solution". While it accounts for 24% of all global greenhouse gas emissions of human origin, it also mitigates the effects. The "4P1000: soils for food security and climate" global initiative, consisting in boosting soil carbon storage capacity by 0.4%, could be one solution. At the same time, it is vital to come up with new healthy, sustainable ways of producing, processing and consuming food. This will mean building skills. All these changes are now urgent. ■■■

LAND DEALS

The new report from the Land Matrix initiative

The Land Matrix initiative, in which CIRAD is a leading partner, is the global observatory of large-scale land deals. Since 2013, the matrix has been improved to ensure greater transparency as regards the deal situation. The latest Land Matrix report takes stock: 26.7 million hectares of agricultural land worldwide have been transferred into the hands of foreign investors.

Since the year 2000, on a global scale, 26.7 million hectares of agricultural land have fallen into the hands of foreign investors. This represents approximately 2 per cent of the arable land worldwide, or roughly the equivalent to the area covered by the United Kingdom and Slovenia put together.

The report provides detailed information on who is buying up farmland in which regions of the world and how that land is being used. It also highlights the economic, social, and political impacts of land grabs. It is particularly relevant considering the recent decision by the International Criminal Court to hold company executives, politicians and other individuals criminally responsible for environmental destruction and land grabbing.

"The impacts for local communities will likely further intensify in the coming years"

Dr. Kerstin Nolte,
GIGA research fellow
and co-author
of the report.

A PROCESS THAT MARGINALIZES LOCAL COMMUNITIES

The deals primarily concern areas previously used for agriculture. This creates increased competition for land and the potential for conflicts with the local population. More and more agricultural land has changed hands, and is increasingly being actively cultivated, for example to grow cereals, oil palm and sugarcane.

Africa is the continent most impacted by land grabs, with 422 deals covering a total area of 10 million hectares. Other heavily impacted regions are Eastern Europe and Southeast Asia. Most of the investors are from Malaysia, the United States, Great Britain, Singapore, and Saudi Arabia. Western European investors are involved in 315 land deals covering an area of 7.3 million hectares.

**26.7 MILLION HECTARES OF LAND
IN THE HANDS OF FOREIGN INVESTORS**



<http://landmatrix.org/en/>

Rice landscape in Madagascar
P. Marnotte © CIRAD

perspective is a series of policy briefs launched by CIRAD to fuel debate, change ideas and support decisions. Two issues on the topic of land tenure were published in 2016.

Industrial investments in agriculture in Central Africa. Establishing the conditions for sustainability and equity – Laurène Feintrenie, Jean-Marc Roda, Alain Rival (no. 37)

Agro-industrial investment must be more closely supervised if it is to benefit socioeconomic development without harming the environment.

Towards concessions 2.0 in central Africa. Managing overlapping rights between industrial concessions and community forestry – Alain Karsenty, Cédric Vermeulen (no. 38)

Concessions 2.0 are a new type of multi-user industrial forestry concession with a different slant on logging in large tropical forests. They renew the concept of local forestry development by recognizing customary territories and overlapping use rights.



Fetching water north of Kisangani in Democratic Republic of Congo. Water is a vital element in the lives of local people. Climate and land use changes could make it increasingly scarce and difficult to access

D. Louppe © CIRAD



OUR PARTNERSHIPS WORLDWIDE

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FRENCH OVERSEAS REGIONS

AGRO-ECOLOGY

Experience sharing in Martinique

Around a hundred players from the agricultural sector in the five French overseas departments met in Martinique from 5 to 9 December to share their experience of agro-ecology. The meeting was the first in a series on the topic, as part of the Agroécodom project, coordinated by CIRAD.



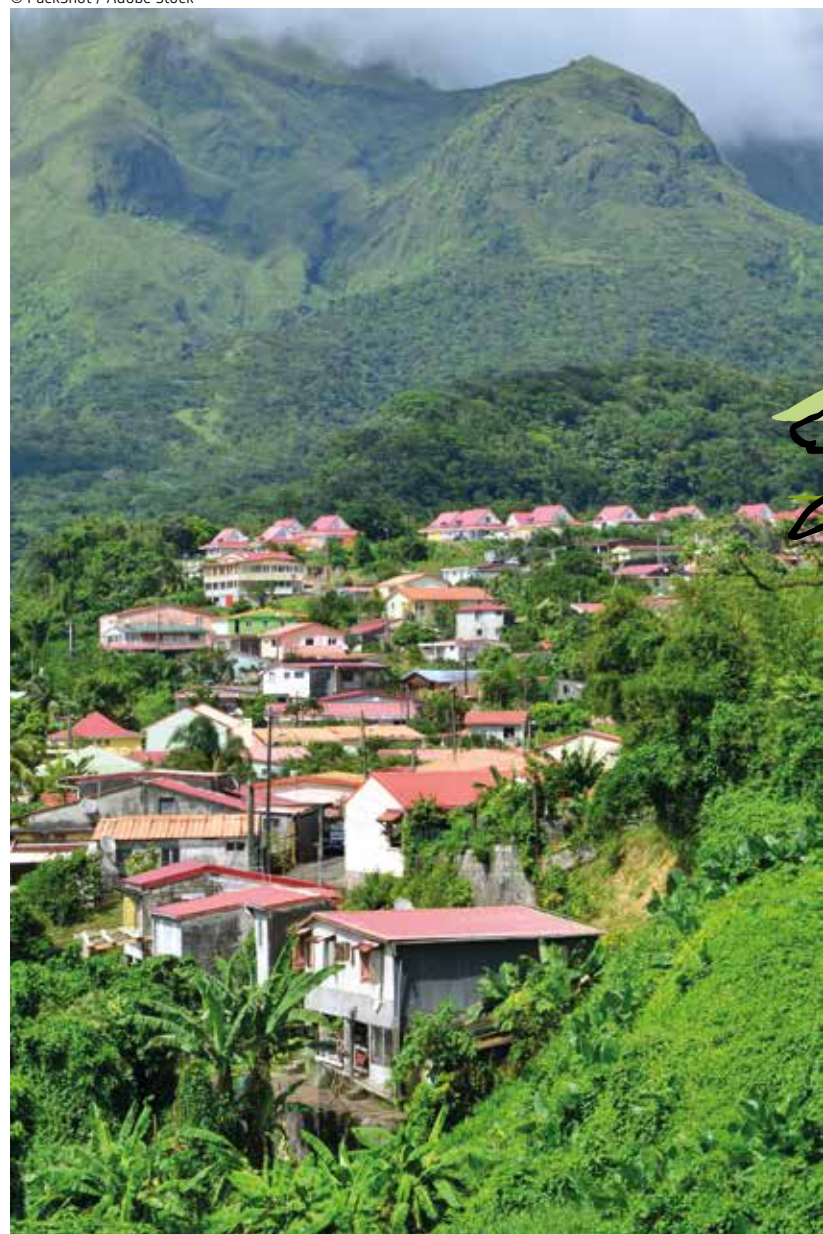
Using service plants in multi-species systems, quality plant material production, soil fertility management, vector-borne animal diseases, and fodder for animal feed were the five topics discussed by players from the Technical Innovation and Transfer Networks (RITAs) throughout the French overseas regions. Workshops and tours of farms in Martinique and of experimental stations punctuated the week of overseas meetings organized as part of the Agroécodom project.

ATTRACTIVE INNOVATIONS

Several agro-ecological innovations met with enthusiasm from the participants, such as vermicompost and so-called "lasagne" planting, pasture in orchards, establishing refuge zones for beneficials, production of sorghum silage to replace cattle feed during shortages, etc. The strong constraints on farming in tropical island environments mean that the French overseas departments are playing a particularly active role in developing agro-ecological practices. ■■

INFO + Agroécodom is contributing to the *Projet agro-écologique pour la France* (French agro-ecology project) launched by the Ministry of Agriculture, Food and Forestry.

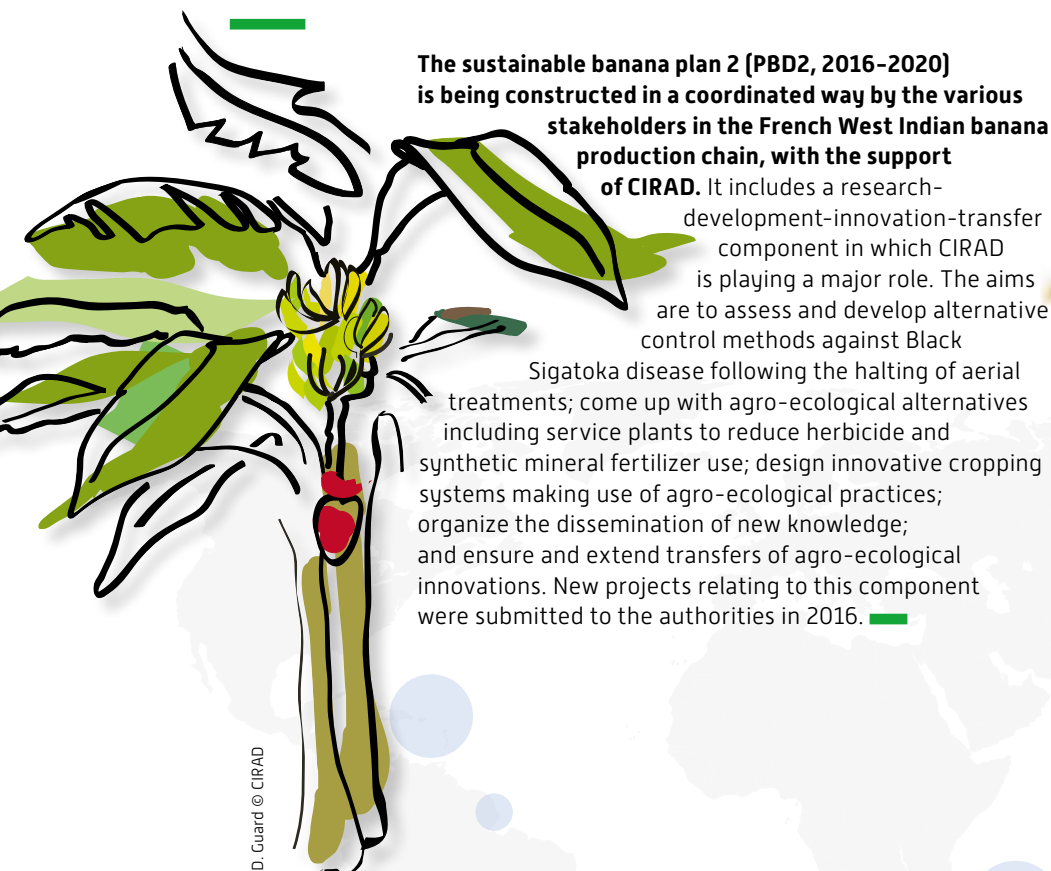
The French overseas departments are playing a particularly active role in developing agro-ecological practices. Here, the village of Morne-Rouge in Martinique
© PackShot / Adobe Stock



The territorial authority of Martinique (CTM) and CIRAD have shared ambitions that prompted them to sign a long-term partnership agreement on 10 May 2016. The aim of the agreement is to build research, innovation, transfer and training capacity so as to ensure food security in Martinique. Research will cover the design of sustainable agricultural production systems capable of contributing to the island's economic development. CIRAD will be supporting agricultural development and common resource management policy making to benefit the island. A monitoring committee will meet annually to assess the operational implementation of the partnership. ■■

PLAN BANANE DURABLE 2

Innovations for the agro-ecological transition in the French West Indies



FOOT-AND-MOUTH DISEASE

Stopping the crisis in the Indian Ocean

The Indian Ocean Commission SEGA One Health network and CIRAD were involved right from the start of the foot-and-mouth disease outbreak in Mauritius and Rodrigues in early July. They provided technical, scientific and logistical support. An analysis of the strains involved suggested that the pathogen had been introduced into Rodrigues from India, in frozen buffalo meat. The disease then spread to Mauritius through animal transfers. As of 17 August 2016, the OIE reported 159 foci in Rodrigues and Mauritius affecting cows, goats, sheep and pigs. The vaccination campaign began in August



with water-based vaccines only suitable for use on ruminants, but were stepped up as of 12 September as soon as the oil-based vaccine was received from the European Union. By the end of 2016, two vaccination campaigns had been completed on all the sensitive animals.

◀ Rural landscape on Rodrigues island
© Unclesam / Adobe Stock



Ticks are the vectors of heartwater, a disease for which CIRAD Guadeloupe is the OIE global reference laboratory © P. Fournier

ANIMAL HEALTH

Increased research capacity in Guadeloupe

New skills, new equipment, and more...

The EU Epigenesis project, launched in 2013, has supported the emergence of the Caribbean Centre for Research and Surveillance of Animal and Zoonotic Infectious Diseases. It has boosted research capacity in terms of animal health, by stepping up exchanges and training operations involving European and Caribbean specialists. It has also enabled the acquisition of new skills in terms of spatial epidemiology, bioinformatics and health economics. These skills are now backed up by advanced equipment, such as a high-security laboratory, and by technology platforms, acquired by the project with a view to analysing proteins, genes and pathogens. Major scientific progress has been made on the bacterium that causes heartwater, with a view to developing effective vaccines, and on the mosquito species that carry the West Nile virus, about which little was previously known in Guadeloupe.

FRENCH OVERSEAS REGIONS

The mountain forests of New Caledonia, in this case on Mount Panié, which culminates at 1628 m, and the outlines of *Agathis montana* trees, conifers that are endemic to the top of this mountain

© Ph. Birnbaum / CIRAD



NEW CALEDONIA

Real-time rainforest
diagnoses

The renewal of the Cogefor partnership (2016–2019) between North Province in New Caledonia, the Institut agronomique néo-calédonien (IAC) and CIRAD will allow the continued acquisition of scientific knowledge on the province's tropical forests. The aim is to optimize forest management and conservation measures in North Province. A few explanations...

The Cogefor project is the result of a joint wish to define an operational framework to optimize rainforest conservation measures. It covers the trees and rainforests of North Province. The first stage (2012–2015) centred on gathering and analysing data on the distribution of forest and tree species. It gave rise to several publications and international presentations, and culminated in a synthesis containing numerous management recommendations.

AN ENVIRONMENTAL INFORMATION SYSTEM

The new stage (2016–2019) is intended to provide conservation services with an environmental information system (EIS) dedicated to operational management of forest habitats. To this end, it is necessary to build spatialized indicators that serve to predict, by extrapolation, the specificities and potential ecological value of all the forest habitats in North Province.

Those indicators will be integrated into an online decision support app (niamoto.io) that will provide managers in North Province with a real-time diagnosis of the ecological properties of any forest habitat in North Province. The app uses two main types of data that are analysed to provide keys for associating taxons and environments

- Occurrences of a species (taxon, longitude and latitude)
- Environmental maps of an environment (altitude, rainfall, soils, habitats, etc).

It is based on data compiled over several years, notably all the data associated with the NC-PIPPN (New Caledonian Plant Inventories and Permanent Plots Network). Moreover, it offers a simplified interface that enables people from outside to take part in the watch, either by adding observations (taxons and environments), or by participating in forest mapping, on a scale of 1:3000. In just a few months, external data have already enabled 32 rapid habitat inventories and 80 taxonomic inventories totalling 1131 occurrences of 354 tree species.

AND NOW?

The niamoto.io portal will be changing substantially, to integrate new analysis functions that will make it a true EIS dedicated to forest conservation. It will no longer "simply" be a matter of reporting on what is known, but of predicting what may be present given the probabilities. CIRAD embarked upon this route by funding 50% of a scholarship for a multi-disciplinary thesis on spatial modelling of ecosystems and resolution of the problem of reserve selection: a global and flexible approach. ■



For almost four years, an IAC-CIRAD team observed, inventoried and measured the forests of North Province from the ground, the air and even space. This collective work provides an illustrated synthesis of the knowledge acquired during this ambitious research programme. It invites readers to discover the astonishing secrets of a natural world that is both rich and original, and in urgent need of protection. ■

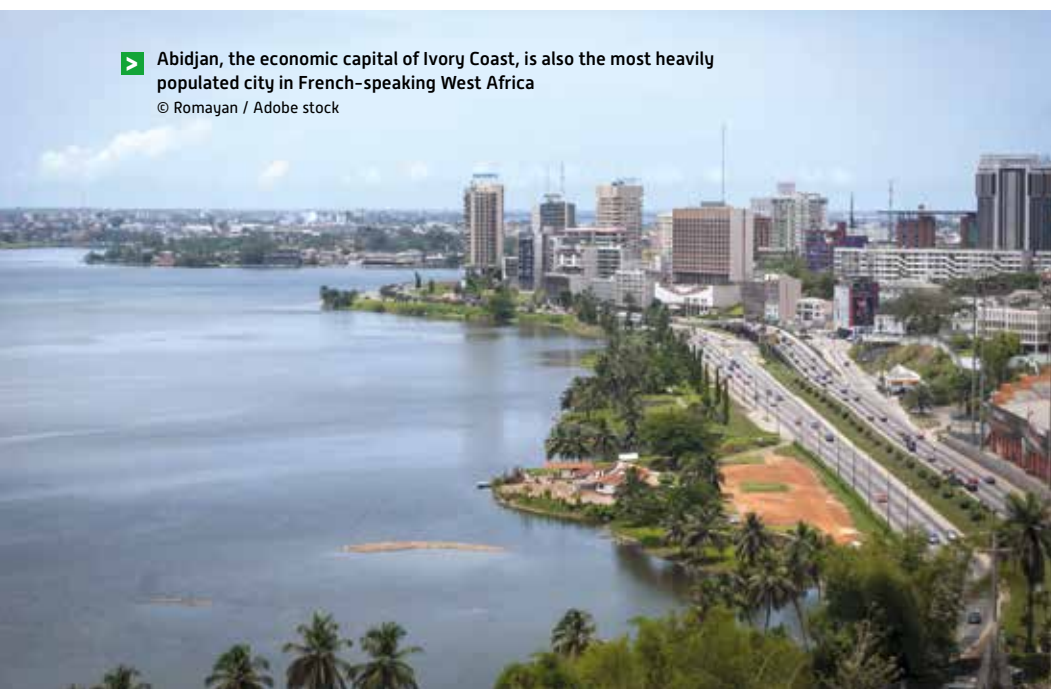
AFRICA

IVORY COAST

Revitalized
partnerships

After 13 years away, cooperation with Ivory Coast has resumed.
CIRAD has opened a regional office in Abidjan

> Abidjan, the economic capital of Ivory Coast, is also the most heavily populated city in French-speaking West Africa
© Romayan / Adobe stock



CIRAD is back in Ivory Coast, after 13 years in Ouagadougou. The Regional Director, Patrice Grimaud, who is based in Abidjan, will be managing CIRAD's operations in nine countries in the sub-region, which in addition to Ivory Coast comprises Benin, Togo, Ghana, Nigeria, Guinea Bissau, Guinea Conakry, Liberia and Sierra Leone.

A LONG-AWAITED RETURN

The long history of collaboration between French agricultural research organizations and universities and research institutes in Ivory Coast has produced significant results that have made the Ivorian agricultural sector one of the continent's most efficient.

The act of setting up a regional office in Abidjan in mid-2016 was proof of the new consolidated partnership between CIRAD

and research, development and higher education establishments in Ivory Coast. The ball was set rolling in July 2014, during a trip to Abidjan by CIRAD's President Managing Director, accompanying French President François Hollande, with the signing of several general agreements. This increased collaboration also saw a visit to CIRAD Montpellier by Professor Ramata Bakayoko-Ly, Ivorian Minister of Higher Education and Scientific Research, and the signing of the first contracts covered by the "research/higher education" component of the deleveraging/development contract [C2D*] between France and Ivory Coast.

The CIRAD office in Abidjan will eventually manage around a dozen researchers. Its activities will be backed up by the CNRA, and also by the Fonds interprofessionnel pour la Recherche et le Conseil agricoles (FIRCA), which receives funding from C2D,

"We are very honoured to be at CIRAD less than two months after Michel Eddi's trip to Abidjan. The reactivity of our exchanges bears witness to the quality of our relationship"

Ramata Bakayolo-Ly,
Minister of Higher Education and
Scientific Research, Ivory Coast



© CIRAD

the Conseil du Café et du Cacao, which orchestrates anything to do with cocoa, and local universities and *grandes écoles*, which are increasingly turning to research on agricultural supply chains - cotton, livestock production, fruits, market gardening, etc. Not forgetting Ivorian bodies such as the Office national de développement du riz, SODEFOR, etc. ■

* The deleveraging/development contract (C2D*) is a mechanism by which public development aid (PDA) debt can be written off for heavily indebted poor countries (HIPC). It is one of the French specific components in the general debt relief initiative. The aim is to ensure refinancing through the donation to the country's budget of PDA repayments refunded by partner countries.



<http://afrique-ouest.CIRAD.fr/>

IVORY COAST

EVENTS

[MARCH]

2 Michel Eddi and Mamadou Sangafowa Coulibaly, Ivorian Minister of Agriculture and Rural Development, sign a general cooperation agreement on agricultural research, appraisals and training.

[MAY]

18 General scientific cooperation agreement signed (P. Grimaud) with the Ivorian Ministry of Higher Education and Scientific Research. Aim: to establish an overall framework for cooperation relating to CIRAD's mandate and the priority research fields pinpointed by the government (five years).

[JUNE]

27 Ramata Bakayolo-Ly, Ivorian Minister of Higher Education and Scientific Research, and Michel Eddi (see photo) sign an agricultural research cooperation framework agreement. Priority operations: to develop agricultural research in partnership with the Centre national de recherche agronomique (CNRA) in Ivory Coast and support the creation of an agro-pastoral farm and an industrial research unit in the field of agronomy (five years).

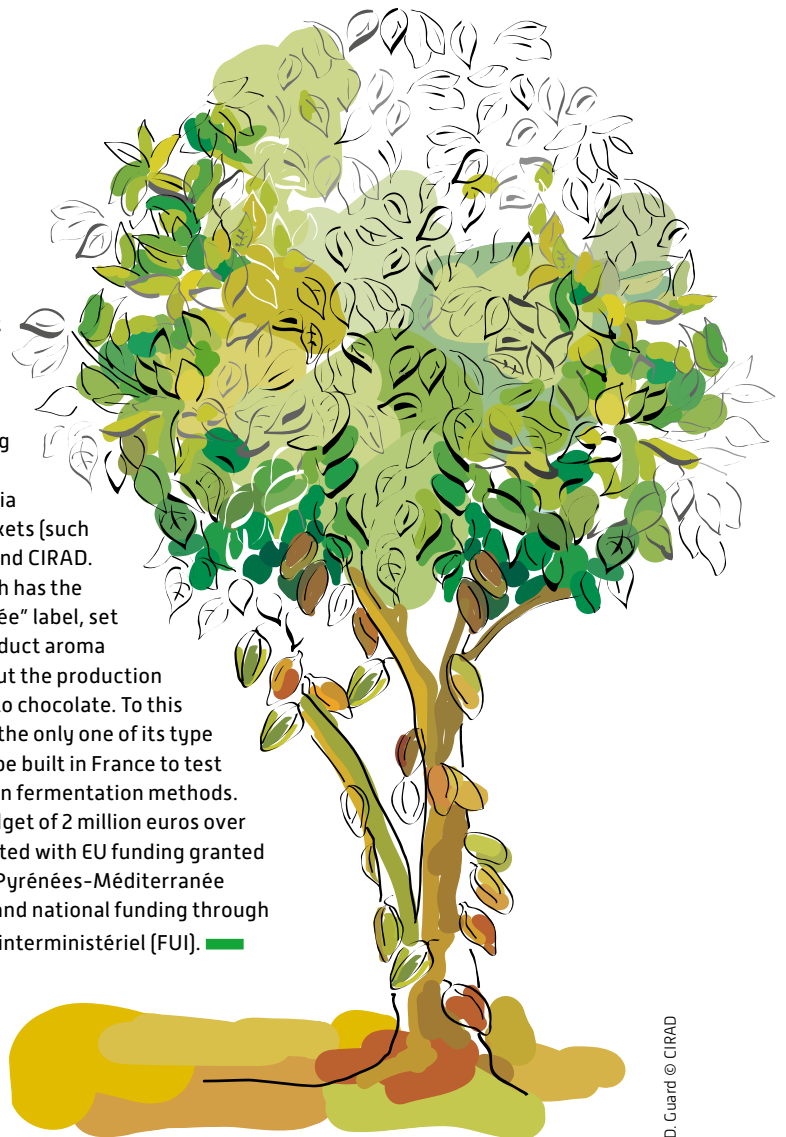
[OCTOBER]

30 Visit of the Cémoi factory in Abidjan by French Prime Minister Manuel Valls, welcomed by its Managing Director, Benjamin Bessi. CIRAD was invited, and presented its involvement in research on the Ivorian cocoa sector.

[NOVEMBER]

17 Memorandum of Understanding with SODEFOR (Ivory Coast) for an exploratory mission in the country. Aim: to identify opportunities for collaboration. The emphasis was placed on natural forests, planted forests, agroforestry, education, training, and climate change mitigation.

French chocolate maker Cémoi launched its "Frenchoc Premium" project in late March, in partnership with Lallemand, the world's leading manufacturer of yeasts and bacteria for specialist markets (such as winemaking), and CIRAD. This project, which has the "Qualiméditerranée" label, set out to control product aroma profiles throughout the production chain, from bean to chocolate. To this end, a fermenter, the only one of its type in the world, will be built in France to test various cocoa bean fermentation methods. Project with a budget of 2 million euros over five years, supported with EU funding granted by the Occitanie/Pyrénées-Méditerranée Regional Council and national funding through the Fonds unique interministériel (FUI).



D. Guard © CIRAD

Stéphane Le Foll and Michel Eddi in West Africa to promote the "4P1000" initiative

In late July, Michel Eddi accompanied French Minister of Agriculture, Agrifood and Forestry and French government spokesperson Stéphane Le Foll on an official visit of Burkina Faso, Ivory Coast and Senegal. During the trip, CIRAD presented farming practices developed with its West African partners. The practices boost soil fertility and carbon capture capacity, while contributing to the



▲ Stéphane Le Foll and Michel Eddi meeting representatives from the Institut sénégalais de recherches agricoles (ISRA) and the domestic biogas programme in Senegal © CIRAD

food security of local people. Some make use of traditional local know-how. The French Minister of Agriculture requested the help of the Heads of State he met to promote these practices in their countries, particularly during COP22, as part of the implementation of the "4P1000" initiative.

AFRICA

FORESTS OF CENTRAL AFRICA

CoForTips is helping users manage resources

The future of the Congo Basin forests depends on two processes: climate change, and land use change – development of crops, infrastructures and logging. The CoForTips project has pinpointed the ecological transitions between different forest formations, making it possible to anticipate the environmental impacts of human activity.

The partners have described the practices and norms that people have developed in response to environmental change. They have built models, in some cases in the form of games, aimed at identifying and building new strategies and finding new forms of collective action.

For instance, CIRAD has used the companion modelling approach to develop AgriForEst. This role playing game describes land use types and

changes in soil cover on a village level within the forest landscape of eastern Cameroon. Players pretend to be households managing natural resources (land, wildlife, and non-wood forest products), human resources (workers) and social capital (interactions with other players) in order to make a living and invest in several aspects of quality of life (QoL), translated into locally relevant QoL resources: food; housing; petrol; soap; schools; rest; cash reserves. The game scenario combines several factors for change within a single story. Past games sessions have pinpointed issues surrounding governance, market access, power imbalances between Bantus and Baka pygmies and between migrants and local people, soil fertility maintenance, and soil restoration. AgriForEst highlights the processes underlying collective action in a typical village in the Congo Basin forest, where local communities are gradually moving

from hunting-gathering and shifting cultivation to subsistence strategies that are more integrated into markets. ■



<http://www.cofortips.org>

Project partners

The CoForTips project, coordinated by CIRAD, associates Liège University, IIASA, the IRD and the partners in the Forenet-Afrique Centrale network (IRAD Cameroon, Douala University, Bangui University, IRET Gabon, INDEFOR, Marien Ngouabi University) and the Autonomous University of Barcelona, ETH-Zurich, the École nationale supérieure des Mines de Paris, Montpellier 2 University, Rennes University, and Toulouse 3 University. ■



◀ The AgriForEst role playing game describes land use types and changes in soil cover on a village level within the forest landscape of eastern Cameroon © Claude Garcia/CIRAD

EVENT

[APRIL]

27 Mindourou and Guéfigué-Guéboda, Cameroon, CoForTips project closing workshop

SECOND EDITION OF THE ATLAS

"A New Emerging Rural World in Africa"

A new, revised and supplemented edition of the atlas *A New Emerging Rural World – An Overview of Rural Change in Africa* was officially launched at the second Africa Rural Development Forum, organized by NEPAD (New Partnership for Africa's Development, a technical body of the African Union) in Yaoundé from 8 to 10 September 2016. The atlas reports on the dynamics at play within the rural world in Africa and on territorial restructuring within the continent.

The atlas takes stock of rural restructuring on the continent, from North to South. It relates data on demographics, population, urbanization and resource use with spatial and economic dynamics, both on a continental scale and through several regional examples, and is a totally original tool. It uses indicators, maps and charts to report on the extent to which population and urban growth and the development of means of communication have modified the nature of rural areas in Africa, although some regions remain very

isolated. It is published jointly by CIRAD and NEPAD, with financial support from the Agence française de développement (AFD), and fits in with NEPAD's Rural Futures Programme, which is intended to support the territorial dynamics and structural change required for sustainable development of the continent.



LEAP-AGRI PROJECT

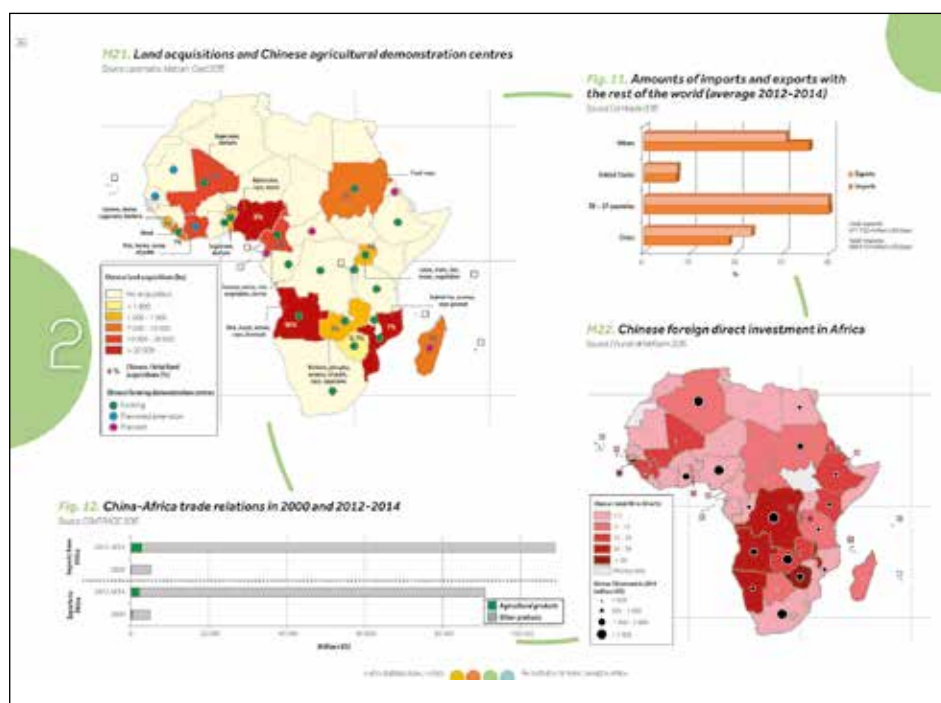
An EU-Africa partnership for food security

Leap-Agri, coordinated by the Agence nationale de la recherche (ANR), addresses the range of issues relating to food security in Africa, through the development of innovative agricultural intensification practices and pathways. CIRAD is heavily involved in the project, launched in December 2016 for a five-year period, which follows on from ProIntensAfrica.

Ensuring food and nutritional security and establishing sustainable agriculture is one of the main challenges for research. African and European researchers, supported by the European Union and the African Union, set out to build an ambitious long-term partnership. The ProIntensAfrica project (2015-2017) laid the foundations for this new partnership by proposing a shared governance mechanism and a research agenda for the sustainable intensification of agrifood systems.

The ANR will be coordinating Leap-Agri, which has a dual objective:

- to co-fund collaborative research projects involving African and European teams, through a trans-national call for projects endowed with 27 million euros, on the issues surrounding sustainable agriculture, food and health, and agricultural and agrifood product markets;
- to help with the long-term structuring of the partnership between the EU and Africa on the research issues relating to agricultural production and food security in Africa.



A New Emerging Rural World – An Overview of Rural Change in Africa

Pesche D., Losch B. and Imbernon J. (eds), second, revised and supplemented edition, NEPAD-CIRAD, 2016

The "Public Policy and Rural Development in Latin America" Platform in Partnership for Research and Training in figures

Founded in 2012 • 35 partners

12 countries in Latin America (Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Mexico, Nicaragua, Peru, Uruguay)

110 researchers involved, including 14 from CIRAD



AGRO-ECOLOGY

Public policy under scrutiny from research

The Public Policy and Rural Development in Latin America Platform in Partnership for Research and Training conducted a comparative analysis of public policies in favour of agro-ecology. A seminar in late 2016 served to take stock of its work, which is also due to give rise to an international symposium, a book due out in 2017, and an in-depth research project.

Eight Latin American countries participated in the comparative analysis of their policies and support mechanisms as regards the agro-ecological transition. "This work is the result of a shared dynamic the likes of which are rarely seen on such a scale",

says Eric Sabourin, leader of the Public Policy and Rural Development in Latin America Platform (PP-AL). Without this solid network, set up in 2012 at the behest and with the support of CIRAD, none of this would have been possible.

In late 2016, a seminar was held to pool the syntheses done in each country. This gave the researchers the chance to fine-tune their comparison method and discuss what the policies had in common or how they differed, the progress made and the difficulties and trends on a regional level. One other aim was to prepare for the dissemination of this work by means of a book and the organization of an international seminar in 2017. Lastly, the foundations of a new comparative research programme were laid, to look more closely into the questions raised by the study.

The researchers identified three types of pathways that lead to the adoption of such

practices: the pressure exerted by social movements (NGOs, producer and consumer organizations); financial, political or climate crises that restrict farmers' access to inputs; and lastly, governmental initiatives such as certification systems, notably for organic farms, or payments for environmental services. Organic farming and agro-ecology were initially designed as alternatives on a production unit level, but their development calls for measures on a territory level. The same goes for resource management, technical support and information and certification networks.

"This work drew the attention of the FAO, which chose to contribute in two ways: by publishing the study in a book due out in 2017 and by supporting the open seminar to be held in Porto Alegre, southern Brazil, in October 2017", Eric Sabourin adds. ■

"Comparing the agro-ecology policies implemented within the various national frameworks shed light on the progress and challenges surrounding the approach chosen by Brazil. The conclusions of this work are important not only in the research field, but also for civil society organizations and decision-makers."

Claudia Schmitt, researcher at the Federal University of Rio de Janeiro, a partner in the PP-AL platform



© F. Boucher / CIRAD

CLIMATE CHANGE

Fighting the coffee leaf rust epidemic

The Procagica project was launched in response to the “health emergency” declaration issued by the governments of Costa Rica, Guatemala, Honduras, Nicaragua, El Salvador and the Dominican Republic following the coffee leaf rust outbreak in 2012-13. It will mean staff members from all three CIRAD departments and their partners from Central America working in the region for several years, notably within the Agroforestry Systems in Central America platform in partnership (AFS-PC), based at the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE).

Various public policies have been drafted in each country, but their implementation has been slow (if not non-existent) and generally insufficient. The national coffee producers’ organizations (and national coffee institutes) in the region generally receive limited State funding and have trouble finding qualified staff. On a national level, the private sector conducts certain operations, but they are primarily geared towards large-scale coffee producers.

The Procagica project set out to build resilience capacity among small- and medium-scale coffee producers in the light of climate change and the epidemic, through the adoption and application of adaptation, mitigation and disaster risk reduction measures. Those measures involve systematic, effective integrated management; research into genetically resistant varieties; public awareness raising; and institutional capacity building, to ensure more effective disease control. ■



◀ Marsellesa is a leaf rust-resistant coffee variety developed by coffee geneticists (CIRAD/IRD)
I. Vagneron © CIRAD

INFO +

Coffee leaf rust is caused by a fungus, *Hemileia vastatrix*. It can cause significant levels of leaf fall. Its history is well known: as long ago as 1869, it devastated the entire coffee sector in Ceylon (now Sri Lanka). Since its introduction into Central America in 1976, the fungus has caused severe epidemics in Costa Rica in 1989, Nicaragua in 1995 and Colombia from 2008 to 2011.

Main partners
in Procagica

Instituto Interamericano de Cooperación para la Agricultura (IICA), CIRAD, Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), Programa Cooperativo Regional para el Desarrollo Tecnológico y Modernización de la Caficultura (PROMECAFE), Banco Centroamericano de Integración Económica (BCIE).



F. Ribeyre © CIRAD

▲ Two CIRAD researchers are expected, to set up a «cocoa» base, since global demand for the crop is continuing to grow

RURAL DEVELOPMENT IN COLOMBIA

A model partnership

Since 2014, against a backdrop of peace agreements being seen as the country’s major challenge, agriculture is a priority, as is rural territorial development. With this in mind, CIRAD opted to renew its partnership agreements with Colombia, and particularly its public research organization, **Corporación Colombiana de Investigación Agropecuaria (Corpoica)**. This reconstruction culminated in late 2015 with the signing of a new framework agreement centring on four conventions.

CIRAD has assigned a researcher specializing in agroindustrial use of farmed fruit resources, to help Corpoica with its national tropical fruits strategy and with implementing rural agroindustrial development projects. Another researcher is involved in the design, practical implementation, and assessment of the performance and impact of agro-ecological cropping systems using direct seeding, mulch-based conservation agriculture (DMC), in conjunction with the El Aceituno seed firm and Corpoica. Lastly, two more researchers will be assigned in 2017, to build a solid “cocoa” base, since global demand for the crop is continuing to grow. In many respects, the partnership between CIRAD and Corpoica could well be a model for emerging countries. Watch this space... ■



TerriStories, a cooperative game for exploring collective rules "to find a collective solution in an uncertain world", developed by CIRAD © A. Binot / CIRAD

ROLE PLAYING GAME

For better health risk management

The Emerging Diseases in Southeast Asia Platform in Partnership for Research and Training (GREASE) has developed a role playing game that contributes to better management of the health risks at the interface between man, animals and the environment, to improve communication on this type of risk, as part of the EuropeAid ComAcross project.

In Cambodia, the game is a platform for communicating with at-risk populations in villages in three of the country's provinces. The aim is to allow villagers to work together to introduce preventive measures against Japanese encephalitis and Nipah virus, so as to protect against disease. The project team, coordinated by CIRAD and notably involving the NGO Agronomes et vétérinaires sans frontières, supports every stage of the game, through discussions intended to improve knowledge of encephalitis on a local level. In Thailand, on a municipal scale, CIRAD's aim is to boost the involvement and management capacity of local players so as to address the health risks linked with poor agricultural and domestic waste management. CIRAD enables players to discuss their points of view regarding the issues surrounding water and soil pollution risks. They can identify and test technical solutions and inter-sectorial coordination scenarios through a role playing game being developed by Panomsak Promburom, coordinator of the ComMod Thai network.

These two experiments were inspired by TerriStories, a cooperative game for exploring collective rules "to find a collective solution in an uncertain world", developed by CIRAD in Senegal. The game was used to develop role playing games with the aim of promoting the "commons management" approach applied to One Health/EcoHealth-type health problems.



<http://www.onehealthsea.org/comacross>

COOPERATION AND RESEARCH

Very high potential in Malaysia

The links between CIRAD and Universiti Putra Malaysia (UPM, Kuala Lumpur) are being strengthened, notably with the launch of the UPM European Laboratory of Excellence (Labex) with Agropolis.

The UPM Labex, initiated in May 2015 and based on the Agropolis Labex in Montpellier, serves to dynamize collaboration and organize researcher mobility to work on tropical supply chain sustainability, climate change and food security in Southeast Asia.

Cooperation within the Institute of Tropical Forestry and Forest Products (INTROP), in collaboration with the Airbus group, is highly active: feasibility of second-generation biofuel production, biomass energy production, fire prevention, and financialization of agriculture and forestry. INTROP has been granted prestigious HICOE (Higher Institution Centre of Excellence) status, a national label held by just 16 research organizations in Malaysia.

In the social sciences field, there has been very fruitful collaboration with IKPDM (Institute of Agricultural and Food Policy Studies). The research conducted concerns new governance policy tools, with particular emphasis on sustainability norms and standards.

During a recent official tour of the region, the then French President, François Hollande, pledged his support for the launch by CIRAD President Managing Director Michel Eddi and the UPM Vice-President of the Malaysian branch of the Sustainable Agricultural Landscapes in Southeast Asia (SALSA) platform, aimed at generating a new platform in partnership for research and training (dP) focusing on research and training topics of regional interest, notably tropical tree crop value chain sustainability.

✓ Natural rainforest, Kinabalu Park, Malaysia © Mrfiza / Adobe Stock



OIL PALM

Beyond the controversies, major research issues

Photo A. Rival © D. Barthélémy



Global demand for palm oil has grown exponentially in recent years and shows no sign of slowing down. CIRAD has been working for some 60 years on this controversial supply chain. Its role is to supply the scientific bases for debate, and above all to find concrete ways of reconciling biodiversity preservation and agricultural development for people in the South. Explanations from Alain Rival, biologist and oil palm supply chain correspondent.

In 2016, the tax on palm oil was re-discussed in the French parliament. What is CIRAD's position?

As soon as it was published, we commented on the rationale on which the draft law was based^[1], and we were subsequently consulted by a commission of experts chosen by the Ministry of Agriculture. Specific import tLines on "tropical oils" will not have any impact on either deforestation or public health, as the global market is tight and driven by emerging countries (China, India, Indonesia, etc). Making certified sustainable oils tax free could trigger a virtuous circle, but if that certification were only applied to palm oil, it would be discriminatory. A solution will have to be found in conjunction with producing countries, which have already embarked on certification processes.

Oil palm cultivation is one of the causes of deforestation in Southeast Asia, but it has also largely helped to alleviate poverty...

In Indonesia, 30% of deforestation is linked to agricultural activities, of which around half is due to oil palm plantations. Growing oil palm has contributed to the emergence of a middle class in some regions, but it is important

to bear in mind that the activity was built on very fragile foundations: socially fragile in view of the increasing scarcity of rural labour and wages that continue to mark time, fragile in climate and health terms in view of the geographical concentration of production, and economically fragile, due to a limited genetic base and substantial reliance on mineral inputs.

How can we reconcile biodiversity preservation with the agricultural development that people in the South really need?

Ecological intensification helps to reduce deforestation by promoting rational increases in productivity^[2]. Global yields are still below 4 t of oil/ha, whereas they could be doubled, notably by using improved seed, rationalizing fertilizer use and recycling palm oil extraction residues. When intensifying, it is important to ensure that the benefits are distributed evenly all along the chain and

that any adverse environmental impact is limited. There is another major challenge: taking account of smallholders and of their specific demands in terms of crop management sequences, planting material or standards.



D. Guard/CIRAD

[1] Rival A. [2016] Huile de palme: une tLine qui ne tirera pas la filière vers le haut. *Pour la Science* no. 462, April 2016, pp: 12-14. http://www.pourlascience.fr/ewb_pages/a/article-tLine-huile-de-palme-mauvaise-solution-36666.php

[2] Rival A. [2016] Huile de palme: quels enjeux de développement ? *Diplomatie*, 82: 80-86, September-October 2016. http://www.geostrategie.com/product.php?id_product=674

THE OIL PALM SUPPLY CHAIN IN FIGURES

20 million hectares planted

Global output of **54 million tonnes**, 15% of which is RSPO certified

40% of global output comes from **5 million** smallholder farmers*

Mean annual yields of **3.8 t of crude oil /ha**, generating around **\$ 1000/ha/year**


87% of global output comes from Indonesia and Malaysia

Oil palms occupy just **7%** of the agricultural land given over to oil crops, but account for **35%** of the vegetable oil produced worldwide

Uses: **75%** food use, **15%** cosmetics and oleochemicals, **10%** biodiesel

Main consumer countries: China, India, Indonesia, Pakistan, European Union

* farming less than 50 ha



Harvesting coconuts,
Java Island, Indonesia

A. Rival © CIRAD

INDICATORS 2016

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ORGANIZATION

APRIL 2017

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SYMPOSIUMS AND CONFERENCES

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AWARDS AND TRIBUTE

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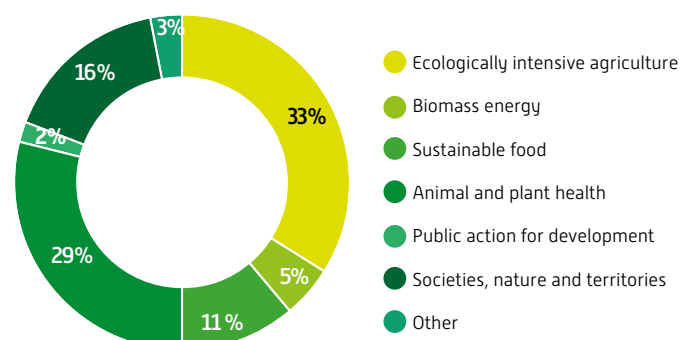
INDICATORS 2016

This section analyses the evolution of the main indicators that reflect CIRAD's activities. While remaining consistent with the monitoring mechanism for the 2014-2018 CIRAD Contractual Objectives and CIRAD's main ambitions, expressed in its 2012-2022 Strategic Vision, the analysis retains the same structure and indicators as in previous years.

AN AMBITION OF SHARING SCIENCE TO MEET THE CHALLENGES FACING SOUTHERN COUNTRIES

The establishment's priorities, expressed via the six strategic lines of research set out in the 2014-2019 Scientific and Partnership Strategy Objectives (SPSOs) are largely reflected in its scientific output in terms of publications. Most of CIRAD's publications in peer-reviewed journals are referenced as per those lines of research, as shown in the figure below.

Distribution by line of research of articles in peer-reviewed journals, with or without impact factor



Source: Agritrop. DIST-DGDRS - The 2016 data are partial: they reflect the state of the Agritrop database as of 15 March 2017.

The distribution of articles in peer-reviewed journals between the various strategic lines of research - just one line per article - varies very little from one year to the next. In 2016, as in 2015 and 2014, three lines were predominant, with almost 80% of articles in terms of volume: **Ecologically intensive agriculture** (33% of the annual volume of articles), **Animal and plant health** (31%) and **Societies, nature and territories** (16%).

Co-publications with operators in southern countries*

Peer-reviewed journal articles, with or without impact factor			
Data smoothed over three years	2014	2015	2016
Articles published with at least one southern author	424	423	407
Total number of peer-reviewed articles	829	824	790

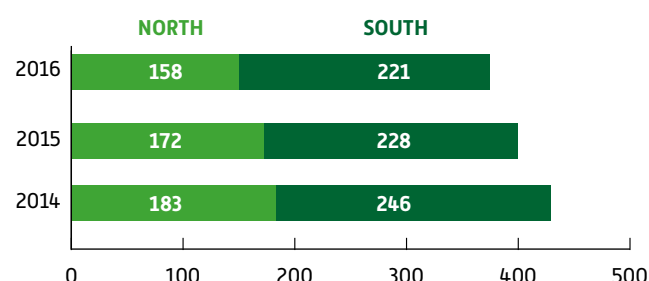
Source: Agritrop. DIST- DGDRS

* A country is classified as a southern country if it is on the OECD/DAC list of official development assistance recipient countries.

Once again this year, CIRAD has proved its determination to build balanced, sustainable partnerships with scientific partners in the South. Co-publications with at least one author from the South made up the majority (51.5%) of all publications and the proportion remains stable.

The number of PhD students supervised by CIRAD (379 in 2016) fell slightly, although it has progressed overall since 2009. The proportion of PhD students from the South remains very high, at almost 60% of the total.

Supervision of PhD students by CIRAD researchers



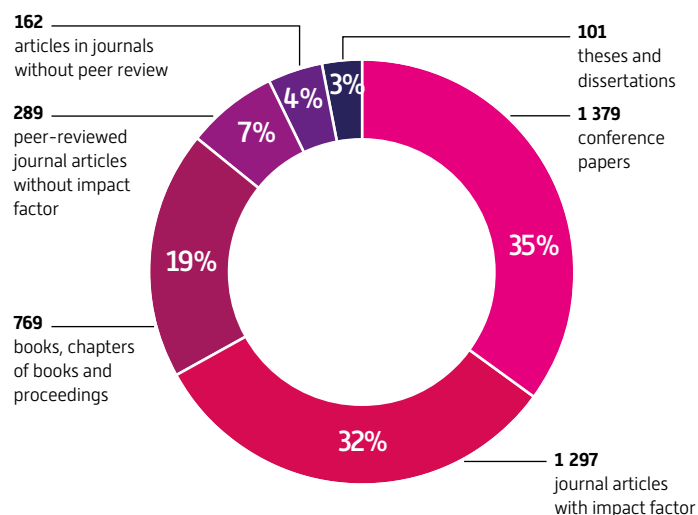
Source: DGD-RS

DIVERSIFIED, HIGH QUALITY SCIENTIFIC OUTPUT

The efforts made by CIRAD to improve the quality of its scientific publications, ensure scientific recognition of its teams and broaden the range of its outputs so as to reach different audiences are reflected in the results below. CIRAD is continuing to work with its partners in the South and all over the world to ensure academic recognition of science for development anchored in the field and co-constructed with its partners in the South, which lies at the heart of its mandate.

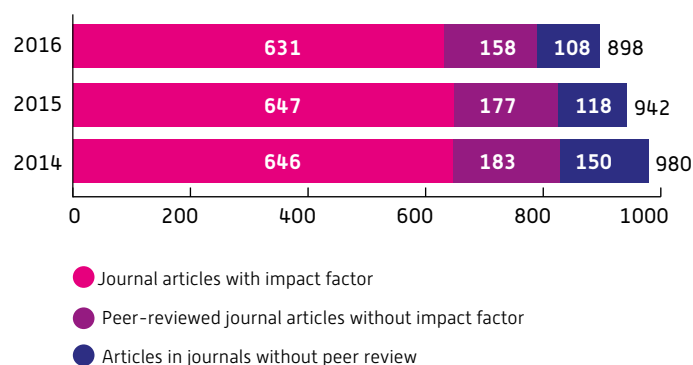
Over the period 2015-2016, articles published in impact factor journals (1297 or 32%) and conference papers (1379 or 35%) accounted for the majority of publications, proportions that remained stable with an increase in the overall number of publications. Annual volumes, smoothed over three years, of articles published in peer-reviewed journals, with or without impact factor, were down slightly (789 in 2016), see graph below.

Distribution, by document type, of CIRAD's publications for the period 2015–2016



Source: Agritrop, DIST-DGDRS - The 2016 data are partial: they reflect the state of the Agritrop database as of 15 March 2017.

Change in the number of journal articles between 2014 and 2016 (data smoothed over three years)



Source: Agritrop, DIST-DGDRS - The 2016 data are partial: they reflect the state of the Agritrop database as of 15 March 2017.

The number of Directors of Research is once again on the up, reflecting the efforts made by researchers to gain academic recognition.

Research training for CIRAD's senior scientific staff

	2014	2015	2016
Number of research directors at CIRAD	162	170	172

Source: SIRH, DGDRD

Agritrop, the CIRAD publications open archive, is now 8th in the French open archives rankings. After just a year, this is a big success for CIRAD and its Scientific and Technical Information Service, and proves its determination to boost free circulation of scientific knowledge worldwide. In 2016, Agritrop comprised more than 96 000 references, including 28 000 full-text documents on agricultural research and rural development in southern countries, with 16 000 on open access. Agritrop is 8th out of 117 French open archives, 177th out of 903 open archives in Europe, and 405th out of 2275 worldwide.

The total number of applications for patents, etc has been stable since 2010. It is relatively low, primarily due to CIRAD's decision to reorientate its intellectual protection strategy towards other ways and means of optimizing its know-how that are more suited to the context in which our partners, particularly those in the South, operate.

Outreach: patents, proprietary variety protection certificates and software programs

	2014	2015	2016
Number of applications for patents, proprietary variety protection certificates and software programs (in brackets: number of patents)	8 [3]	9 [1]	6 [3]

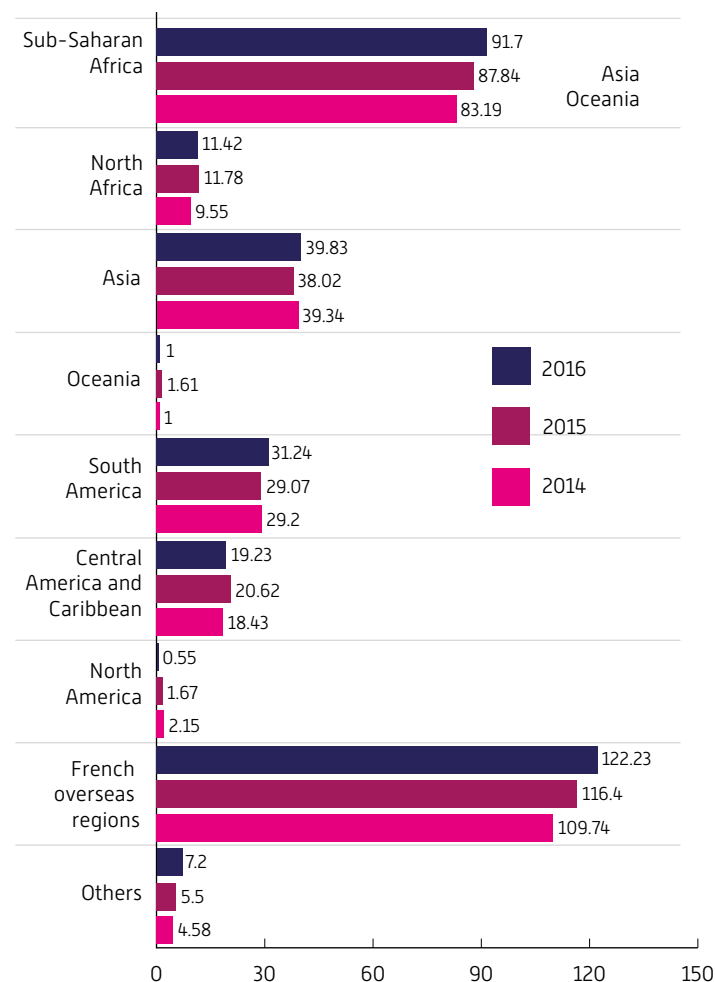
Source: DelValo, DGD-RS

NATIONAL AGRICULTURAL RESEARCH OPEN TO EUROPE AND THE REST OF THE WORLD

In line with its previous commitments, CIRAD is continuing its agricultural research in partnership activities: on a French regional level; on a national level, notably through its collaboration with INRA on scientific and international cooperation issues, as well as with other French research and training organizations for environmental and agricultural issues within the AllEnvi alliance and the IAVFF-Agreenium national consortium; on a European level with key initiatives (ERA-NET Cofund LEAP-Agri), to structure agricultural research for development operators; and on an international level, with a special focus on the 23 platforms in partnership for research and training (dPs) and the consolidation of initiatives undertaken with the Consultative Group on International Agricultural Research (CGIAR).

Geographical mobility of CIRAD staff members is continuing to rise, with +20 full-time equivalents, in line with the priority given to placing CIRAD researchers abroad and in the French overseas regions. After significant growth in dPs between 2012 and 2013, the number of senior scientific staff members posted to dPs is stable, while numbers in the French overseas regions are continuing to progress. Of the 23 dPs, 13 are located in Africa and the Indian Ocean, five in Latin America, four in Asia, and one in the Mediterranean (see table below). The total number of overseas missions fell again in 2016 (-13 full-time equivalents), particularly in Central and South America. Sub-Saharan Africa remains the principal destination (30% in volume terms), with 24 full-time equivalents. CIRAD's presence in the field in the South has therefore grown, with the increase in the number of staff members on assignment compensating for the fall in the number of missions.

Distribution of overseas postings, according to destination (in full-time equivalent)



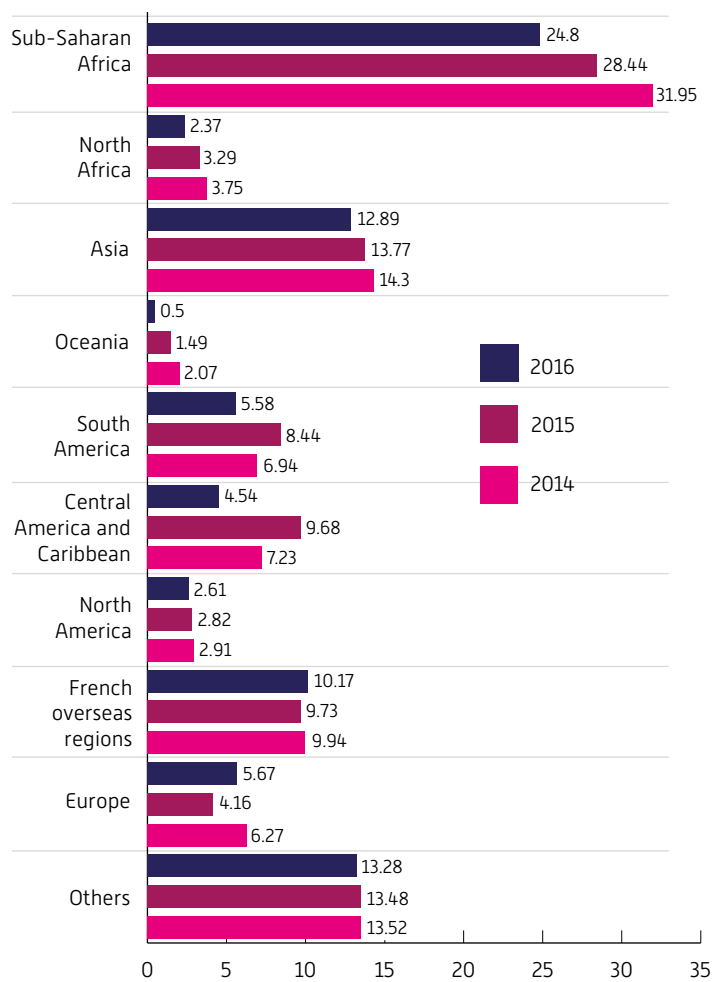
Source: SIRH-DG-DRD

Number of CIRAD senior scientific staff members on assignment/number of senior staff members assigned to platforms in partnership (dPs) and the French overseas regions (in full-time equivalent)

	2014	2015	2016
No. of scientific staff members on assignment	297	313	325
No. of scientific staff members assigned to dPs	127	131	133
No. of scientific staff members assigned to French overseas regions	110	116	122

Source: SIRH, DGD-RD

Distribution of missions, according to destination (in full-time equivalent)



Source: SIRH-DG-DRD

In 2016, CIRAD's success rate for FP calls for proposals was down slightly (15.6%), but in the current highly competitive context, it is still higher than the average success rate of 12% in Europe. These results may reflect greater familiarity with the operating methods and demands of the H2020 programme and the stress placed on supporting project design within the framework of the Resource Development Pact.

CIRAD's EU research and development projects (FP) between 2014 and 2016

	2014	2015	2016
Number of projects submitted	24	30	32
Number of projects funded	3	6	5
Success rate (%)	13	20	15.6
Number of projects coordinated by CIRAD	30	1	1

Source: Europe Office, DGDRS

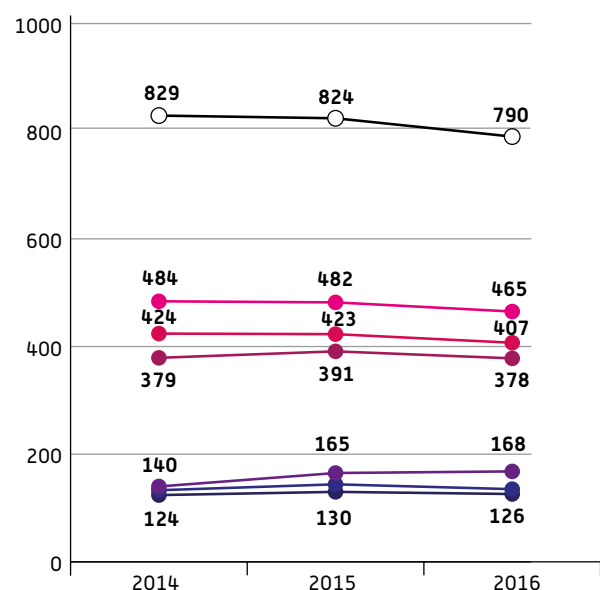
INDICATORS

2016

Almost 60% of peer-reviewed journal articles, with or without impact factor, were co-published with an international institution outside the European Union (EU), primarily with institutions in southern countries (52%), as mentioned above. The number of co-publica-

tions with institutions in France (48%) was also significant, and stable. The increase in the number of co-publications with INRA, reflected in the graph below for the years since 2014, stabilized in 2016 (17%).

Change in number of CIRAD co-publications between 2014 and 2016 (data smoothed over three years)



Source: Agritrop. DIST-DGDRS - The 2016 data are partial: they reflect the state of the Agritrop database as of 15 March 2017

- Total number of peer-reviewed journal articles, with or without impact factor*
- Articles published with an international institution, excluding EU**
- Articles published with a southern institution
- Articles published with a French institution
- Articles published with an EU institution, outside France
- Articles published with INRA
- Articles published with a northern institution, outside EU

* Co-publications are calculated by citation count. This count measures the "participation" of the institution in scientific output: the institution is credited with unitary participation in a publication when its presence in the publication is confirmed by its address. Consequently, the values obtained for French, EU or international operators are not additive.

** An international institution is an institution not located in France. It may be in a southern or northern country.

Platforms in partnership for research and training (dPs)

Region	National platforms in partnership (dPs)	Regional platforms in partnership (dPs)
AFRICA		
	PPZS - Senegal - Lines 1, 5, 6	ASAP - West Africa - Lines 1, 4, 6
	RP-PCP - Zimbabwe - Lines 1, 4, 6	DPFAC - Central Africa - Lines 1, 6
	CRDPI - Congo - Lines 1, 6	SISTO - West Africa - Lines 3, 5, 6
	Forests and Biodiversity - Madagascar - Lines 2, 5, 6	DIVECOSYS - West Africa - Line 1
	PCP Agroforesterie - Cameroon - Lines 1, 5, 6	One Health OI - Indian Ocean - Line 4
	PP & G - South Africa - Lines 5, 6	IABAO - West Africa - Line 1
	SPAD - Madagascar - Lines 1, 6	
ASIA		
	HRPP - Thailand - Lines 1, 6	CANSEA - Southeast Asia - Lines 1, 6
	Malica - Vietnam - Lines 3, 5	GREASE - Asie du Sud-Est - Line 4
LATIN AMERICA		
	PCP AFS-PC - Costa Rica - Lines 1, 5, 6	AMAZONIE - Amazon Basin - Line 6
	CIBA - Brazil - Line 1	PP - AL - Latin America (10 countries) - Lines 5, 6
		RéSA-CaribVET - Guadeloupe-Caribbean - Line 4
MEDITERRANEAN		
		SIRMA - North Africa - Lines 1, 5, 6

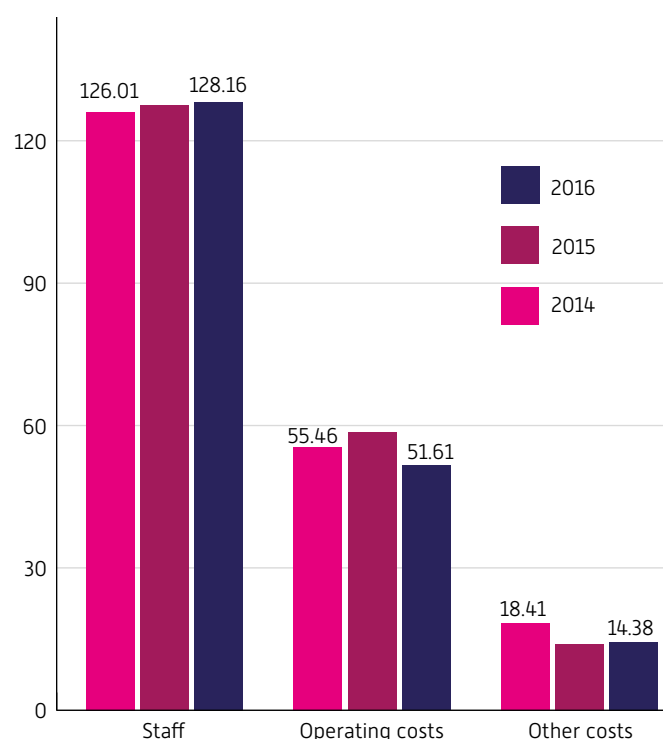
Source: Partnerships Office, DGDRS

A STRUCTURE AND RESOURCES TAILORED TO NEW CHALLENGES

The work begun by the organization within the framework of its Resource Development Pact with a view to consolidating its economic model and the efforts made by its staff to boost its contractual resources are reflected in an overall increase in contractual activity, as shown in the chart below, although that increase slowed in 2016. The results for 2016 confirm the greater profitability of contractual activity and the increase in European funding (structural funds and R&D funds). Moreover, operating costs were reduced in 2016, primarily by cutting operating costs, despite a slight increase in the payroll.

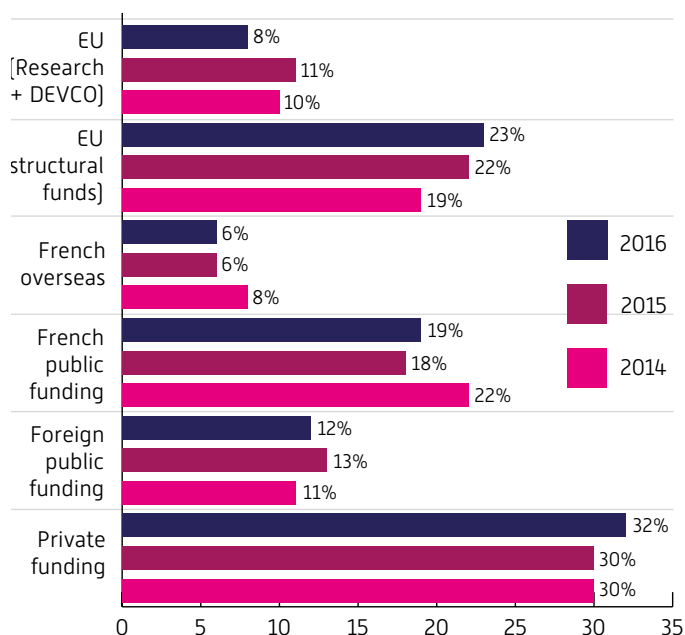
CIRAD has embarked upon a dynamic employment policy, with a view to building the skills required by its scientific and geographical partnership strategy. An attempt was made in 2016 to make up the fall in staff numbers seen until 2015, for "classified paid" staff members. The number of grant-funded research students fell again in 2016, although the proportion remained at almost 3% of total staff numbers.

Operating costs, excluding internal subcontracting 2014-2016, in million euros



Source: DCaf, DGDRD (cf. "Management Report")

Resources generated by CIRAD: amount and annual breakdown as a percentage (excluding joint contracts)



Source: DCaf, DGDRD (cf. "Management Report")

Total CIRAD staff numbers (full-time equivalent)

	2014	2015	2016
Number of "classified paid" permanent contracts	1 635	1 627	1 639
Number of grant-funded PhD students	64	58	55,5

Source SIRH- DGDRD

Annual breakdown of "classified paid" jobs (%) per category (including grant-funded research students with CIRAD contracts)

	2014	2015	2016
Senior staff	64,1	65,9	67,3
Grant-funded PhD students	3,8	3,4	3,3
Ancillary staff	1,5	1,3	0,9

Source SIRH- DGDRD

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[1] BIOS - Biological Systems [2] PERSYST - Performance of Tropical Production and Processing Systems [3] ES - Environments and Societies

SYMPOSIUMS AND CONFERENCES

[JANUARY]

6-8 > Dakar, Senegal. **FAO/CIRAD Enteric Methane Workshop**, 1st West African stage of an international project on reducing methane gas emissions linked to the intensification of ruminant rearing.

13 > Dakar, Senegal. First seminar in a cycle entitled **"Acteurs, savoirs et dispositifs du développement participatif au Sénégal - Regards croisés"**.

29 > Montpellier, France. Food, Health, Well-being **"I am what I eat"**. 5th Annual Conference of the UNESCO Chair in World Food Systems. Co-organized by CIRAD.

[FEBRUARY]

1-5 > Dakar, Senegal. Annual meeting of the **Aval Fonio project to improve fonio postharvest aspects and promotion in Africa**, funded by the African Union. Organized by CIRAD and ESP-UCAD.

[MARCH]

16-18 > Bali, Indonesia. **ICOPE 2016 Sustainable Palm Oil and Climate Change: The Way Forward Through Mitigation and Adaptation**. Co-organized by CIRAD.

15-17 > Dakar, Senegal. **First technical meetings of PRAPS (Projet régional d'appui au pastoralisme au Sahel)** on sustainable management of pasture in the Sahel, funded by the World Bank and coordinated by CILSS, attended by 120 people from six Sahelian countries.

21-24 > Dakar, Senegal. **6th International Metrology Conference in Africa (CAFMET 2016)**.

30-31 > Montpellier, France. CIRAD, a participant in the **EU CAAST-Net+ project**, brought together more than 30 African and European experts. CAAST-Net+ is a network of 26 partner organizations throughout Europe and sub-Saharan Africa working to support bi-regional cooperation in the field of research and innovation.

[APRIL]

4-9 > Yaoundé and Douala, Cameroon. **Workshops to discuss the definition of organic agriculture in Africa and Cameroon**, within the framework of the ABASS project on the diversity of organic farming systems in sub-Saharan Africa and their contribution to food security.

18-19 > Richard-Toll, Senegal. **GloFoodS Regal project workshops**, coordinated by CIRAD and INRA, with dairy sector stakeholders. GloFoodS aims to shed light on the different aspects of global food security and nutrition.

25 > Brussels, Belgium. **Innovative Ways for Sustainable Nutrition, Food Security and Inclusive Agricultural Growth**: high-level consultation organized by the EC's DG DEVCO. With the contribution of CIRAD.

28-29 > Dakar, Senegal. Meeting of **WP2 "In-Depth Case Studies" (IDCS) of the ProIntensAfrica project**, coordinated by CIRAD and WECARD.

[MAY]

2-6 > Dakar, Senegal. CIRAD was co-organizer of a workshop on **research achievements centring on the Great Green Wall – issues and debates with development stakeholders**.

23-24 > Dakar, Senegal. Workshop on the **GITES initiative (Integrated Management of Territories in Dry Zones)**.

25-27 > Montpellier, France. **Agroforestry on the main stream? 3rd European Agroforestry Conference**, organized by 'INRA, CIRAD and Montpellier SupAgro, with the support of the European Agroforestry Federation (EURAF) and the Association française d'agroforesterie (AFAF).

31-1 June > Dijon, France. **1es Rencontres francophones sur les légumineuses**. Co-organized by CIRAD.

[JUNE]

14-17 > Rome, Italy. **Climate-Smart Agriculture in Action**. Annual Forum of the Global Alliance for Climate-Smart Agriculture (GACSA). With the participation of CIRAD.

15-16 > Brussels, Belgium. **European Development Days**. Organized by the European Commission. Lab Debate organized by CIRAD on agricultural value chains and sustainable development.

19-23 > Montpellier, France. **ATBC 2016 53rd Annual Meeting of the Association for Tropical Biology and Conservation**. Co-organized by CIRAD.

22-23 > Paris, France. **GloFoodS**, Discussion of French and international research, at AgroParisTech. GloFoodS is a joint INRA-CIRAD initiative aimed at shedding light on the different aspects of global food and nutritional security.

23 > Paris, France. Transitions pour la sécurité alimentaire mondiale. **International reporting seminar on the work done by the 27 research projects in the GloFoodS metaprogramme**. Organized by CIRAD and INRA.

23 > Montpellier, France. **Nuit de l'agro-écologie**. Public debates centring on agriculture, organized by the French Ministry of Agriculture. With the participation of CIRAD.

24 > Paris, France. Usages des terres et sécurité alimentaire dans le monde en 2050. **International conference to present the results of the Agrimonde-Terra foresight exercise**. Organized by CIRAD and INRA.

28-30 > Montpellier, France. **AgMIP6 6th Global Workshop of the Agricultural Model Intercomparison and Improvement Project**. Organized by Columbia University (New York) with financial support from the DFID (UK Aid Department for International Development) and USDA (US Department

of Agriculture, Agricultural Research Service) and scientific support from INRA and CIRAD. Coordinated by Agropolis International.

30 > Toulouse, France. **Observation de la Terre en Afrique – Enjeux de développement**. Organized by CIRAD with IGN International, the CNES and the IRD as part of Tse Space Show 2016.

[JULY]

4 > Paris, France. Transition climatique, énergétique et écologique pour une planète durable. **Scientific meetings of the French Alliance for Environmental Research (AllEnvir)**, of which CIRAD is a member.

8-10 > Danang, Vietnam. CIRAD was co-organizer of the Journées de Tam Dao, JTD 2016 **"Les enjeux de la transition énergétique au Vietnam et en Asie du Sud-Est"**, at Duy Tân University. Each year since 2007, this summer school has provided training in social science analysis methods – geography, economics, statistics, socio-anthropology, history, etc – for almost 100 participants from South-east Asia (students, teachers, researchers, civil servants and development operators).

[SEPTEMBER]

18-25 > Hanoi, Vietnam. dP Grease was co-organizer of a summer school, **"Computational Biology for Infectious Diseases"**.

26-28 > Montpellier, France. **ISRFG 2016 14th International Symposium on Rice Functional Genomics**. Organized by CIRAD.

26-30 > Ouagadougou, Burkina Faso. **Training for some twenty innovation facilitators** provided by the CDAIS project, of which CIRAD is a member, in partnership with INERA and Ouaga 2 University.

27-29 > Madrid, Spain. **10th Annual EPIZONE Meeting > Going Viral**.

[OCTOBER]

6-7 > Brussels, Belgium. **European One Health/EcoHealth Workshop**. With the participation of CIRAD.

8-16 > France. **Fête de la science 2016**. With the participation of CIRAD. In Montpellier: "Du cacao au chocolat, percez le mystère des arômes".

10 > Inauguration in Montpellier of the new Maison de la télédétection (MTD) facility, with double the previous floorspace. The MTD, opened in Montpellier more than 20 years ago, works to process Earth observation data with a view to sustainable management of agriculture and territories, in France and in southern [...]

countries. The new installations, backed by the Regional Council, the French state and the EU, will contribute to the development of spatial remote sensing in France, in support of public policy.

10-14 > Montpellier, France. Agro-ecological approaches to promote innovative banana production systems. **X International Symposium on Banana**, organized by Bioversity and CIRAD. Banana consumption in Europe was up again in 2015, by 3% compared to 2014. Researchers and producers are now developing agro-ecological cropping strategies to produce dessert or cooking bananas.

16-19 > Dakar, Senegal. **A training course, "Vous avez dit Elevage durable"** was held at Gorée Institute in Gorée. It was intended for CIRAD staff members and their partners, and attended by around forty participants from Senegal, Mali, Burkina Faso, Kenya, Madagascar, Brazil, France, Vietnam and Tunisia.

[NOVEMBER]

18 > Brussels, Belgium. **Seminar on the ImpresS and Impresa initiatives** on the impact of research, with the EC SCAR AKIS and ARCH groups, for research for development donors (with the participation of DGs AGRI, RTD, DEVCO and those of IFAD).

30-1 December > Brasília, Brazil. **Franco-Brazilian seminar on joint international research structures**, organized by the National Council for Scientific and Technological Development (CNPq) and the French Embassy. This was the first such event centring on international scientific collaboration involving Brazilian institutions. CIRAD, the CNRS and the IRD were strongly represented. For CIRAD, the three platforms in partnership for research and training involving Brazil (dPs CIBA, Amazonie and PP-AL) and ORE-Eucalyptus were presented by a Franco-Brazilian team.

[DECEMBER]

1^{er} > Montpellier, France. **Public debate on global food security** in Montpellier, organized by Agropolis International and the UNESCO Chair in World Food Systems.

1-2 > Paris, France. **Communs et Développement**. Conference organized by the Fondation pour les études et recherches sur le développement international (FERDI), CIRAD, the Centre de recherches insulaires et observatoire de l'environnement (CIRIOBE) and the IRD.

4-7 > Melbourne, Australia. **One Health/EcoHealth 2016**. 1st congress bringing together the One Health and EcoHealth approaches. With the participation of CIRAD.

[FEBRUARY]

17 > CIRAD formalizes its links with the Centro nacional de sanidad agropecuaria [CENSA] in Cuba. The agreement, signed for five years (2016-2021), confirms the long-standing relationship between the two organizations, initiated via the CaribVET animal health network. CENSA is a research and higher education establishment under the supervision of the Cuban Ministry of Higher Education. It is a leading partner in the construction of a major integrated project on agriculture and the environment, on a Caribbean level, being led by CIRAD with the framework of the Interreg V programme.

27-6 March > Paris, France. **International Agricultural Show.** With a CIRAD stand on the topic of supply chains and sustainable development. Numerous visits from ministers and overseas delegations.

[MARCH]

4 > General Memorandum of Understanding (GMOU) with **Hanoi University of Science and Technology (HUST)** and the **University of Science and Technology of Hanoi (USTH)** to promote the development of collaborative research operations in the field of bioenergy and chemical engineering, and to boost regional and international cooperation.

16 > CIRAD renews its partnership on **oil palm with the PT Smart firm in Indonesia.**

15-18 > CIRAD participates in the **Salon international des industries et techniques agroalimentaires (SIAGRO)** in Dakar.

21-25 > Paracou, French Guiana. **Thematic course on the functional ecology of tropical forests in the light of climate change** with Labex CEBA [Centre for the Study of Biodiversity in Amazonia].

24 > In signing a **cooperation agreement** at Agropolis, the Mayor of Campinas and the Mayor of Montpellier formalize the links and convergences between Agropolo, an agro-environmental platform in Brazil, and Agropolis International.

[APRIL]

12 > A general agreement signed with the **Ministry of Agriculture in Zimbabwe** seals 20 years of collaboration. CIRAD is officially a preferred partner for Zimbabwe. The agreement will facilitate CIRAD's research and development operations.

20 > Agreement on collaboration with the **Pan African Tsetse and Trypanosomiasis Eradication Campaign (AU-PATTEC)**, at the African Union HQ in Addis Ababa.

[MAY]

2 > Memorandum of Understanding with the **US Department of Agriculture (USDA)** Agriculture, Agricultural Research Service (ARS), for fruit fly research.

9-11 > Relaunch of cooperation with the **Institut de Technologie alimentaire (ITA)** in **Dakar** through the signing of a new general agreement followed by a scientific workshop.

10 > CIRAD and the **Martinique territorial authority** join forces.

18 > CIRAD signs a general agreement with **Mohammed V University in Rabat (UM5R)** to: define the orientations and general framework of relations between them and develop collaborative operations in the field of the human and technical sciences in relation to the environment, agriculture, plant and animal health, agrifood chains, land use planning and biotechnologies, for the next five years.

18 > General scientific cooperation agreement with the **Ivory Coast Ministry of Higher Education and Scientific Research**, for five years. Aim: to define the overall framework for cooperation in line with CIRAD's mandate and the priority research fields defined by the government.

19 > Inauguration of **CIRAD's new offices in Abidjan.**

25 > **ISRA-CIRAD workshop** and signing of a new cooperation agreement by their respective DG and President Managing Director, in Dakar.

25 > General agreement with **Ecom Agroindustrial Corp. Ltd.** Aim: to cooperate on research and development operations for an eco-friendly coffee supply chain in Latin America. Agreement signed for 15 years.

26 > Creation of a **new platform in partnership for research and training: Innovation and Plant Breeding in West Africa (IAPWAO)** through the signing of an agreement between WECARD (Senegal), the IER (Mali), INERA (Burkina Faso), INRAN (Niger), ISRA (Senegal), Montpellier SupAgro, Thiès University (UT, Senegal) and CIRAD. The agreement will run for five years. dP IAPWAO will contribute to regional integration of AR4D in West Africa and the move to turn the national centre specializing in dry cereals and intercropping [CERAAS] into a regional centre of excellence [RCE].

31 > **André Vallini visits CIRAD.** After the CGIAR and the IRD, André Vallini, French Secretary of State for Development and French-Speaking Countries at the Ministry of Foreign Affairs continued his visit to Montpellier, at CIRAD.

[JUNE]

8 > Partnership agreement (research and training) with the **Ministry of Fisheries, Aquaculture and the Maritime Economy in Guinea (MPAEM)**, in Conakry.

8 > Memorandum of understanding with the **University of Southern Mindanao (USM, Philippines)** (research and training) signed for five years.

9 > Memorandum of understanding with the **Real IPM Company (K) Ltd (Kenya)**, which produces organic insecticides, to establish procedures for scientific and technical cooperation (five years).

22 > Memorandum of understanding with the **Cambodian Rubber Research Institute (CRRI, Cambodia)** to assess the productivity of rubber growing in Cambodia (five years).

23 > Memorandum of understanding with the **Institute of Technology of Cambodia (ITC)**, confirming existing and future cooperation activities in various fields, from food and food security to renewable energies and the environment.

23 > General scientific cooperation agreement with the **Royal University of Agriculture (RUA, Cambodia)** (five years).

28 > Cooperation agreement with the **Agricultural Model Intercomparison and Improvement (AgMIP) project.** Aim: to boost collaboration between CIRAD, the AgMIP project (UK, USA, CGIAR) and the CCAFS [CGIAR climate change programme] with a view to improving characterization of sub-tropical agro-ecosystems with low fertility and low input use.

30-31 > Meeting of the international scientific partners of **Sine Saloum El Hadji Ibrahima NIASS University (USSEIN)**, in Dakar (Senegal), under the aegis of the Minister of Higher Education and Research (MESR), with Agreenium-IAVFF President Marion Guillou, guest of honour.

[JULY]

1^{er} > General cooperation agreement with the **Fondation Avril**, a recognized public-interest organization (five years).

7 > **Carole Delga, President of the Occitanie region**, visits CIRAD in Montpellier.

11 > GMOU with the **Department of Agricultural Land Management (DALaM)** in **Laos**, to implement the ACTAE project, aimed at facilitating the drafting and implementation of agro-ecology principles and practices in Laos.

[AUGUST]

30 > General Memorandum of Understanding with **CARE International in Myanmar (CARE Myanmar)** for rubber research. To run until 31 December 2017.

[OCTOBER]

11 > Cooperation agreement with the **Instituto de Investigaciones Agroforestales (INAF)** in Havana (Cuba): academic and cultural exchanges in the education and research sectors. Three years.

12 > General collaboration agreement with the **French Ministry of Agriculture, Food and Forestry (MAAF)** for six years.

14 > Framework collaboration agreement with the **Institut des hautes études pour la science et la technologie (IHEST)** and **INRA**. Aim, for the coming three years: 1) to train senior staff and high fliers in scientific and technical culture and consolidate their understanding and consideration of societal changes and the impact of research; 2) to help anticipate the terms of public debate on INRA and CIRAD research topics such as agriculture, the environment and food; 3) to take joint initiatives in these fields so as to ensure that international organizations add these issues to their agendas.

20 > Framework partnership agreement within the Maison de la Télédéttection between **AgroParisTech, IRSTEA, the IRD and CIRAD**. Aim: to determine governance and management methods for the Maison de la Télédéttection. Agreement signed for ten years.

[NOVEMBER]

17 > Launch of the **"4P1000" initiative** at COP22 in Marrakech, with 200 signatories.

[DECEMBER]

12 > Visit from **Roberto Ridolfi, DG-DEVCO for Sustainable Growth and Development (during the AC6SD conference organized by CIRAD).**

AWARDS

The Académie d'agriculture de France recognized Philippe de Reffye on 5 October 2016, for the originality and exceptional results of his work on plant growth modelling and simulation. With more than 250 publications, 32 PhD students supervised, more than 4200 citations, and several start-ups, including BIONATICS SA and IN-TRASENS, Philippe de Reffye has built an international network of partners working on plant growth modelling.

The network is backed by the entities he has set up, multidisciplinary laboratories the likes of which had never been seen before, with multiple supervisory bodies, such as AMAP (Plant Architecture Modelling Workshop*), the first CIRAD-INRA joint research unit.

Philippe de Reffye has also put a great deal of energy into training through research, notably in China, where he was a visiting professor at China Agricultural University and the Chinese Academy of Sciences.

* Now Botany and Modelling of Plant Architecture and Vegetation.

The 13th La Recherche prize ceremony on 30 November recognized the best scientific publications of 2015. The "Coup de cœur" prize went to the article "A look inside the PI@ntNet experience", co-written by the members of the PI@ntNet consortium, associating CIRAD, INRA, INRIA and the IRD in collaboration with Tela Botanica.

A well-deserved prize for this collaborative wild plant identification support system.

PI@ntNet is available free on AppStore and Google Play, and has had more than 2.4 million users since its launch in 2013.

A web version is also available: <http://identify.plantnet-project.org/>

TRIBUTE

Henry-Hervé Bichat, founder of CIRAD



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Testimonies, interviews and emotional exchanges... Ten months after his death, a day of tributes to Henry-Hervé Bichat highlighted the achievements of this visionary and the untiring work of this committed humanist, who founded CIRAD. More than 100 participants - agronomists, researchers, teachers, training staff, senior officials from France, Africa and South America, and also his family - gathered together on Friday 17 June 2016.

More than 100 people, invited by CIRAD President Managing Director Michel Eddi and INRA President François Houllier, gathered to remember Henry-Hervé Bichat, who died on 31 August 2015, aged 77. The day comprised four sessions: the man of the land, the man of action, the man of compassion and lastly, the builder.

Almost 20 testimonies retraced his career, while detailing the different facets of his colourful personality.

AFRICA, THE THREAD RUNNING THROUGH HIS CAREER

He was an agronomist, and a major part of his professional career and commitment was devoted to Africa, and Ivory Coast in particular. He turned the issues raised by the continent into a means of interpreting the world as a whole, which guided his own rationale and work.

THE BIRTH OF CIRAD

It was in the 1980s that Henry-Hervé Bichat participated in the planning and implementation of the reform of French agricultural research institutes that led to the founding of CIRAD. He was appointed CIRAD Director General, and subsequently INRA Director General and Director General for Education and Research at the French Ministry of Agriculture.

He leaves his mark as a man committed to his century, serving a cause: that of agricultural development, particularly in southern countries, which he saw as a calling.

WORKING TOGETHER FOR TOMORROW'S AGRICULTURE

The men and the women working at CIRAD come up with novel solutions tailored to the needs of rural societies and their environment.

Partnership is both a means and an end for them.

These men and women are committed to building sustainable farming systems capable of feeding nine billion people by 2050.



CIRAD

1650 staff members

A budget of **€ 200M** in 2016

**Main agricultural
research player**
in the French overseas regions



PARTNERSHIP

400 researchers posted abroad
and to the French overseas regions

19 000 days
of missions/year

Activities in more than **100** countries
in partnership with **150** organizations



TEACHING

5400 hours
of teaching each year

400 PhD students
supervised in 2016,
57% from southern countries

Partner in **120** courses
in higher education (Masters to PhD)
in France and overseas



RESEARCH

800 publications per year,
including **400** with researchers from partner countries

More than **20** dPs
(platforms in partnership for research and training)
worldwide

800 researchers
and technicians
from all over the world received each year



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for the sustainable development of
tropical and Mediterranean regions

**Working
together
for tomorrow's
agriculture**

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